The impact of the NHS reforms on social welfare: the case of coronary revascularisation services

by

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ABSTRACT

This thesis assesses the impact of the 1991 health care reforms on the British National Health Service with respect to one specialist service, coronary revascularisation, and examines the ways in which greater improvements in social welfare could be achieved. It is divided into three broad sections. The first section outlines the background to the reforms, the assessment criteria against which the reforms are to be measured and the service to be evaluated. The second section measures the impact of the reforms on efficiency and equity, the chosen assessment criteria, by means both of quantitative and qualitative analyses. The analyses describes the changes which had occurred since the introduction of market mechanisms into the NHS in 1991. Variations in the availability and use of coronary revascularisation services decreased and the contracting process became more sophisticated which suggested the reforms had been instrumental in increasing efficiency and equity. However, large variations remained and market mechanisms continued to cause a series of problems which signified that the reforms were still a long way off achieving an efficient allocation of resources. The third section considers how greater social welfare could be achieved. A strategy for improving social welfare involved managing the market for coronary revascularisations more effectively. An audit of waiting list management in three hospitals demonstrated that patients were often not treated within an appropriate time. The potential to improve efficiency and equity by more effective management of demand for coronary revascularisations therefore existed and the development of guidelines was recommended. Such guidelines were developed with the aim of prioritising patients according to their urgency of need. Finally, the thesis discusses the implications both for health care policy and future research.

This thesis is dedicated to my mother and father

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PART I

CHAPTER 1

INTRODUCTION

The fundamental goal of any health care system is to maximise social welfare. Given the inevitability of scarce resources the aim is to maximise the benefits derived from health care within the resources available. Failure to achieve this leads to inefficiency. In the late 1980's there was growing concern regarding a crisis in the funding and performance of the NHS, predominantly due to the increase in demand for health care. There were large variations in the use of medical and surgical procedures between hospitals and regions therefore it was likely that much inefficiency existed. Reform of the British National Health Service (NHS) set out to improve efficiency by introducing market mechanisms into the health care system. The reforms created a competitive market on the supply side of the health service within the framework of public finance.

The introduction of the reforms in 1991 caused particular concern among health care professionals about the ability of market mechanisms to preserve and develop highly specialised services. It was feared that these high cost services, which are only provided in a small number of provider units would be put in jeopardy by the effects of the reforms. While the theoretical literature on the potential effects of introducing market mechanisms into health care systems is extensive, empirical evidence is largely lacking, predominantly due to the difficulty of evaluating the reforms in the short-term. Despite these difficulties it is important to understand what impact the reforms have had on these specialist services and to identify strategies for improving social welfare.

The aim of the thesis was to assess the impact of the 1991 health care reforms on the

British National Health Service with respect to one specialist service, coronary revascularisation, using an economic framework and to examine the ways in which greater improvements in social welfare could be achieved.

The objectives were:

(1) to describe the 1991 reforms of the NHS;

(2) to select relevant economic criteria for assessing the impact of the reforms on social welfare;

(3) to apply these criteria to coronary revascularisation services in a large representative sample of the UK;

(4) to assess how the contracting process has influenced any observed changes;

(5) to determine whether and how the management of demand for coronary revascularisation services could be improved;

(6) to make recommendations to improve social welfare; and

(7) to suggest a future research agenda.

The thesis is presented in three parts. *Part one* outlines the background. First, in Chapter 2, the 1991 reforms of the National Health Service are reviewed, outlining the financing and structure of the health service before and after the reforms. Then, in Chapter 3, the assessment criteria against which the reforms are to be measured are discussed. Methods of measuring changes in social welfare are presented. The two dimensions of social welfare, economic efficiency and distributional justice (equity) are assessed in relation to health care, concluding with operational definitions of the

assessment criteria, and finally, using these criteria, the theoretical and empirical literature on the reforms are reviewed. Chapter 4 describes the service to be evaluated. Trends in the provision of coronary revascularisation services, the need for these services, what is known about their effectiveness and cost-effectiveness, and the recent developments in monitoring revascularisation outcomes and improving the quality of patient care are reviewed.

Part two measures the impact of the reforms on social welfare, using the assessment criteria, by means both of quantitative and qualitative studies. In Chapter 5 the quantitative analysis assesses the patterns and trends in availability, utilisation and cost of these specialist services. The qualitative analysis, reported in Chapter 6, assesses the views of purchasers and providers over the first three years of the reforms and thus helps to provide explanations for the quantitative findings.

Part three considers how greater social welfare could be achieved. Chapter 7 discusses the evidence from the quantitative and qualitative analyses and considers a strategy for improving social welfare. It reports on a study to assess how providers currently manage demand and the potential improvements in efficiency and equity that could result from improved management, through the use of guidelines. In Chapter 8, the early development of guidelines for prioritising patients according to their urgency of need is described. Finally, in Chapter 9, the implications both for health care policy and future research are considered.

CHAPTER 2

HEALTH CARE REFORMS IN THE UK

2.1 Introduction

The most radical reform of the National Health Service (NHS) since its inception in 1948, outlined in the White Paper 'Working for Patients' [1] came into legislative force on 1 April 1991. It had been initiated in the late 1980s when there was growing public concern regarding a crisis in the funding and performance of the health service [2,3]. Critics of the government argued that despite the increase in expenditure on the NHS during the 1980s it was not sufficient to meet the growing demand brought about by demographic change, new costly medical techniques, growing public expectations and planned improvements in the service.

The ideology behind 'Working for Patients' had been set by several other preceding government initiatives. The first was the growth in managerialism brought about by the Griffiths Management Enquiry in 1983 [4]. The second was the introduction of schemes of income generation [5] when health authorities were freed from restrictions of selling services for profit. Third was the policy of contracting out. In 1983 a Department of Health circular required health authorities to set up programmes of competitive tendering for their cleaning, catering and laundry requirements [6]. Later, this initiative was spread to other non-clinical and clinical services such as transport and diagnostic services. Finally came the growth of the idea of health care markets. Introducing market mechanisms into health care systems had been discussed in academic and policy literature during the 1980s and in 1985 Enthoven suggested that to achieve greater efficiency in the NHS the roles of purchasers and providers should be separated [7]. He envisaged that purchasers would choose the best value care for

their resident population from a number of alternative competing providers, including private hospitals.

Despite these changes there was growing concern that the financing of the NHS should undergo major reform. In the face of growing unpopularity the then Prime Minister, Margaret Thatcher, set up a working group to review the alternative methods of financing the NHS including a health tax, national insurance with or without an entitlement to contract out and private insurance encouraged by means of vouchers or tax relief. It was later decided by the group not to consider different methods of financing the NHS other than through general taxation but to consider different ways of providing health care that would ensure a more efficient use of resources[1]. The model chosen to achieve this aim was that proposed by Enthoven in 1985 [7], though the changes were far more radical than his original ideas. The aim of the reforms was to introduce:

'*A funding system in which successful hospitals can flourish...will encourage local initiatives and greater competition. All this in turn will ensure a better deal for the public, improving choice and quality of services offered and the efficiency with which these services are delivered*' [1].

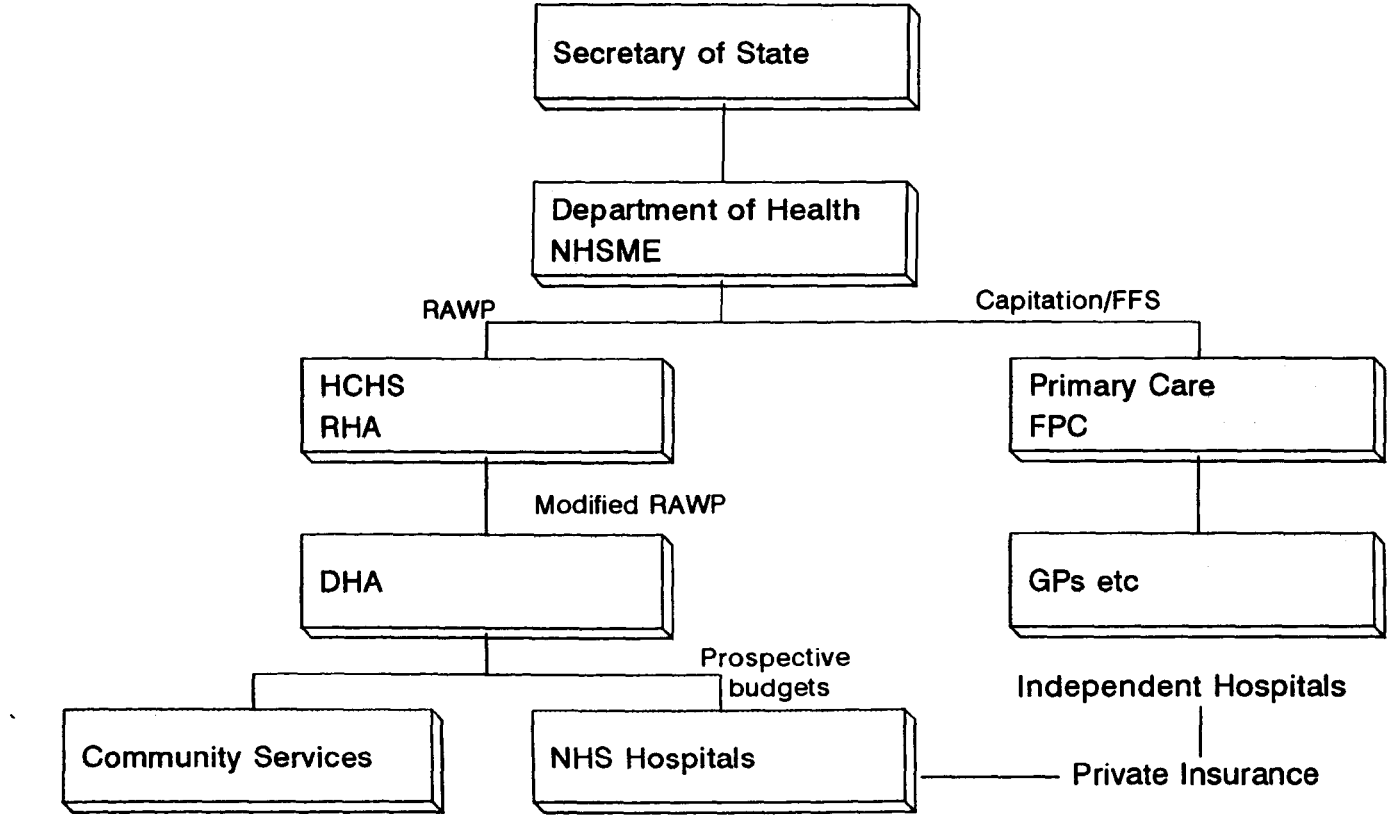
[1] Private insurance was however encouraged for the elderly by means of tax breaks

2.2 The NHS before the 1991 reforms

Before April 1991 the NHS provided a system of comprehensive health care without any prior contribution requirement, and almost entirely free of user-charges, although user-charges did exist for drugs, dental and ophthalmic services. The NHS was financed primarily from general taxation with a contribution from the National Insurance Fund. The total NHS budget was voted annually by Parliament and allocated between on the one hand the hospital and community health services and on the other hand primary care (Figure 2.1). The hospital and community health services were financed by regional health authorities (RHAs) and managed by district health authorities (DHAs) which had the dual role of meeting the health care needs of their resident population and of providing hospital services. Regional resource allocation was made on the basis of a formula, known as the RAWP formula (Resource Allocation Working Party) designed to reflect the relative health care needs of each region [8]. Its objective was to achieve equalisation of funding for equal needs. The RHAs then allocated resources, on the basis of existing facilities and expected costs of hospital provision, to the separate DHAs within each region. Hospitals received a budget from their DHA.

Primary care was the responsibility of local Family Practitioner Committees (FPCs), who's allocation was based on a mixture of capitation and fee-for-service. FPCs were responsible for general practitioner (GP) services, pharmacists, dentists and ophthalmic services. Finally, the private sector before the reforms was relatively small and was

Figure 2.1: Financing of the NHS pre-reforms



NHSME=National Health Service Management Executive, RAWP=Resource Allocation Working Party
FFS=Fee for Service, HCHS=Hospital and Community Health Services, RHA=Regional Health Authority,
DHA=District Health Authority, FPC=Family Practitioner Committee, GPs=General Practitioners

mainly financed by insurance rather than by patients directly.

2.3 The NHS after the 1991 reforms

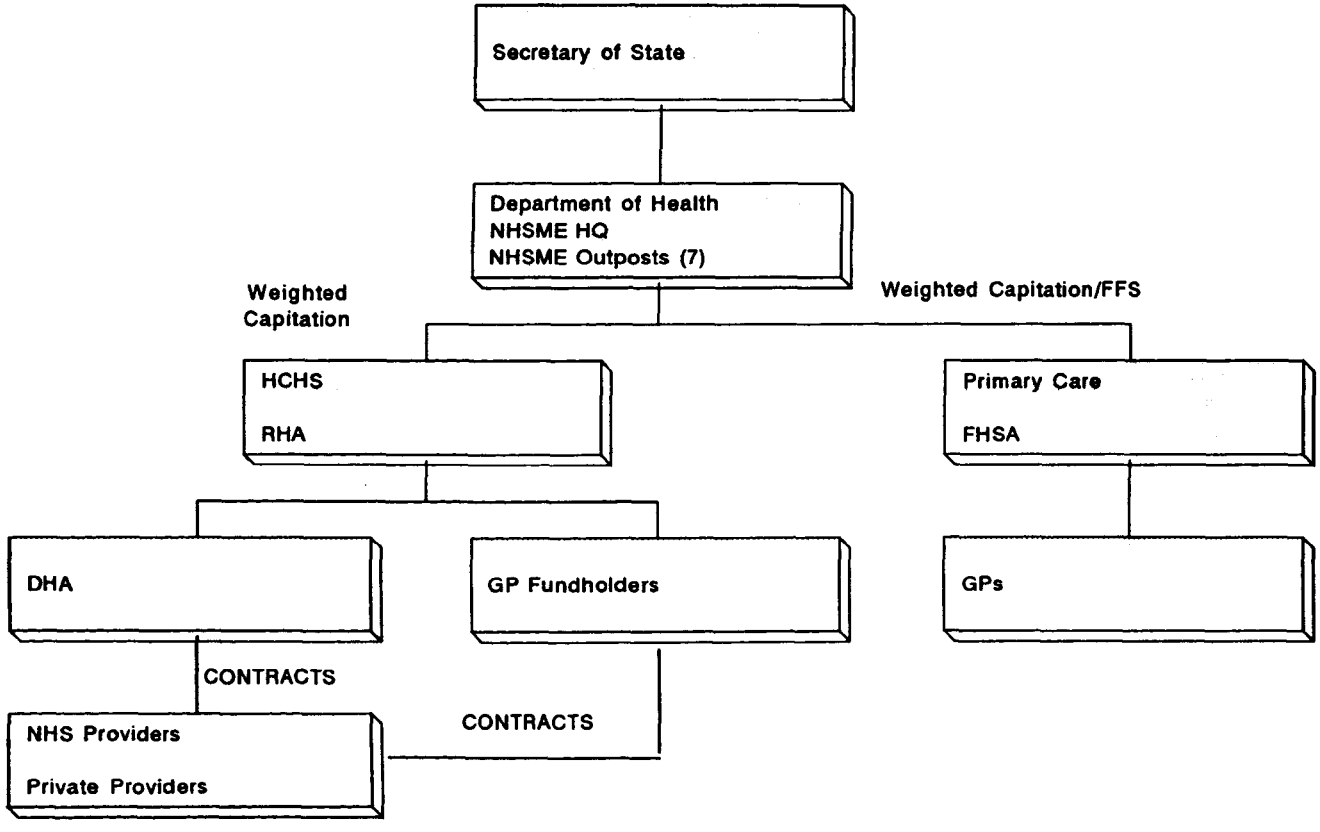
The main concept behind the reforms was the creation of a competitive market within the framework of public provision and finance brought about by the separation of responsibility for funding and providing health services. This concept followed that initially proposed by Enthoven. Two further changes not derived from Enthoven, were the creation of self-governing hospitals and practice budgets for GPs. On the demand side of the new NHS were the **purchasers**, which included DHAs and general practice fundholders (GPFHs). On the supply side were the **providers**, which initially included NHS Trusts, directly-managed units (DMUs), Special Health Authorities (SHAs) and independent hospitals. The idea was that a competitive market would be created on the supply side and that competition would take place between existing providers for contracts offered by purchasers (Figure 2.2).

2.3.1 The Purchasers

Funding the NHS continued to be through taxation and national insurance contributions and no significant increase in the use of user-charges was envisaged. The responsibility of the RHA and DHA for finance was separated from that of provision of services (Figure 2.3). RHAs were allocated resources on the basis of a

Figure 2.2: Demand and supply in the reformed NHS

Figure 2.3: Financing of the NHS post-reforms (1991/92)



NHSME HQ=National Health Service Management Executive Head Quarters, FFS=Fee for Service
HCHS=Hospital and Community Health Service, RHA=Regional Health Authority, GPs=General Practitioners
DHA=District Health Authority, FHSA=Family Health Service Authority

new capitation formula weighted according to the age and health distribution of the regional population and the relative costs of providing services locally. The overall effect of the new formula was a redistribution of resources between regions creating winners and losers. North East Thames was the main beneficiary and Oxford the biggest loser [9].

DHAs assumed the role of purchasing agencies. Their budget was decided on the basis of the new weighted capitation funding formula and distributed through the RHA. Their new responsibilities were to assess the health care needs of their resident population, to determine the most cost-effective means of meeting such needs and to prioritise the pattern of health care delivery by deciding how much should be spent on each aspect of secondary and tertiary care. Hospitals received funding from DHAs on the basis of agreed contracts or service agreements (Table 2.1). In theory, the contracts set out the quantity, quality and cost of services to be provided through the year.

General practices with at least 11,000 patients were given the opportunity to become fundholders for a defined range of services. This included 110 specific hospital treatments (mostly elective surgery, including coronary revascularisation), most outpatient care, community services, drugs and practice staff. They therefore had the responsibility of providing primary care to patients on their practice list and purchasing secondary and tertiary care from providers. This created a large number of small purchasers adding extra stimulus to competition between providers for their business.

Table 2.1: Contract type definitions

Type	Definition
Simple Block	Purchasers pay the provider a fixed sum for access to a defined range of services or facilities. Such contracts may include some form of indicative workload agreement or fixed volume.
Sophisticated Block	Purchasers pay providers a fixed contract sum for access to a defined range of services or facilities. Indicative patient activity targets or thresholds with 'floors' and 'ceilings' are included in such contracts as well as agreed mechanisms if targets are exceeded. Some elements of case-mix may be included.
Cost and Volume	This contract specifies outputs in terms of patient treatment rather than inputs in terms of services or facilities available. Purchasers do not purchase fixed volumes but will develop contracts with a fixed price being paid up to a certain volume of treatment and a price per case being paid above it, up to a volume ceiling.
Cost per Case	The hospital agrees to provide a range of specified treatments in line with a given contract price.

Source: NHS Executive, Purchasing Unit (1994) [10]

2.3.2 The Providers

The new NHS had four types of provider. First were the self-governing hospitals which 'opted out' of DHA control and were established as NHS Trusts. They are independent, non-governmental organisations and are directly accountable to the Secretary of State for health. In order to gain self-governing status hospitals had to demonstrate they had an efficient management structure. Once a Trust they had the power to manage their own assets. The Government (eventually, though not initially)

allowed them some influence as to the pay and conditions of their staff, to accumulate surpluses, borrow, and dispose of their assets. The Government hoped that these freedoms would provide the necessary incentives for Trusts to provide services which were cost-effective and responsive to consumer needs. In addition to Trusts were three other types of provider. First, the DMUs, which remained under the direct control of their respective DHA. Second, the private providers, which comprised only a small but increasing part of the market. Third, the SHAs, which received direct funding from the Department of Health for their activities and remained under the direct control of the Secretary of State.

Primary care became the responsibility of local Family Health Service Authorities (FHSAs), who adopted similar responsibilities to the DHA, and were regulated by RHAs. Regions began to set indicative drug budgets for each practice based on assumptions of average prescribing costs, in an attempt to reduce, or at least control, drug expenditure.

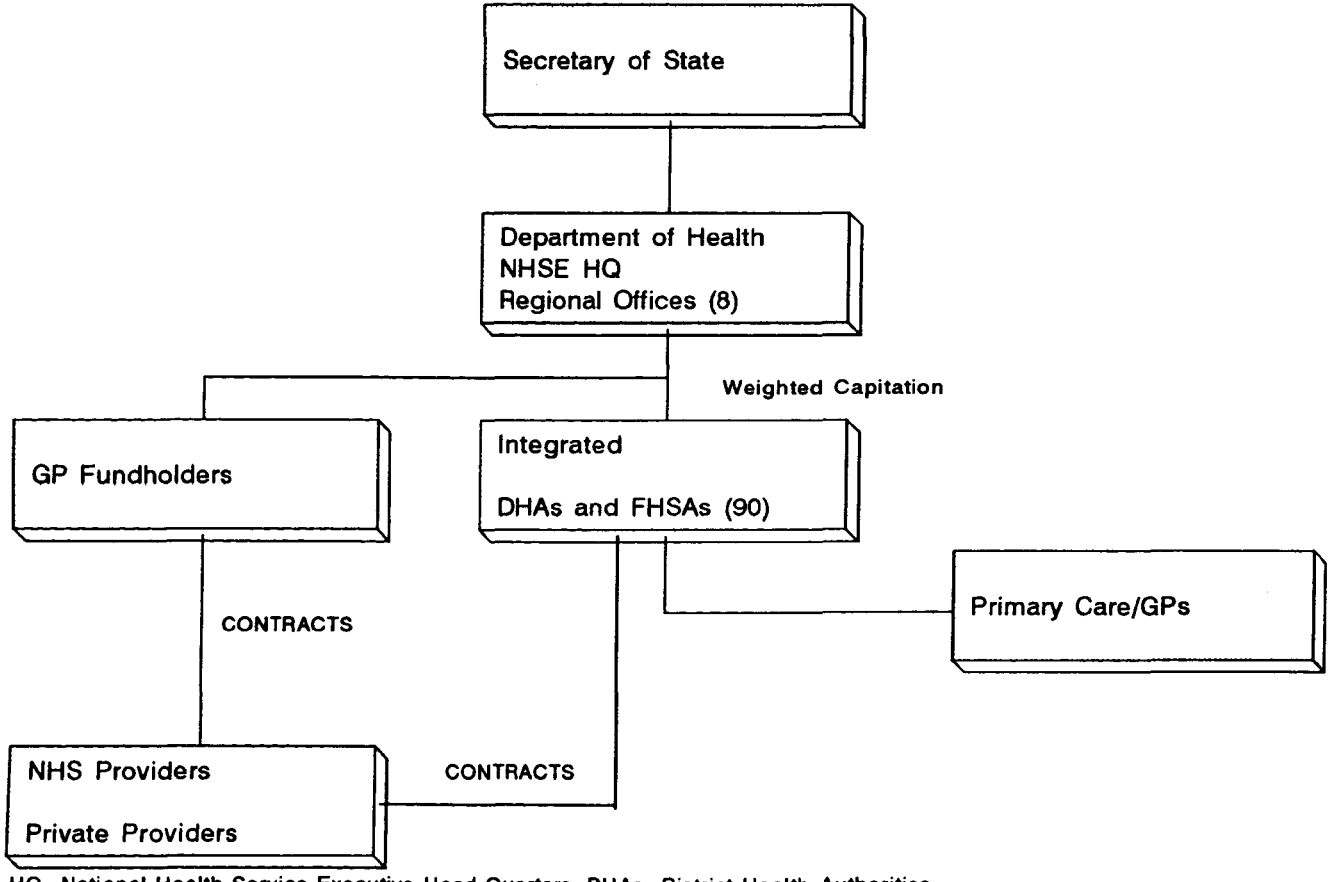
2.4 The evolution of the market economy

The introduction of market mechanisms into the NHS did not occur instantaneously mainly due to the fact that there had been no precedent for health care markets in the UK and experience of the system elsewhere was limited. The new structure of the NHS was therefore introduced in stages so as to minimise disruption to the service.

In the first year the National Health Service Management Executive (NHSME) decided that a steady state should be maintained. This required DHAs to secure contracts in the first year which reproduced existing patterns of activity and referrals. For this to occur it was also necessary not to change the overall distribution of resources. Consequently, the introduction of weighted capitation was held back during the first year of the reforms. Purchasers and providers were given a year of preparation. After the first year purchasers were free to change existing referral patterns and activity levels and weighted capitation was introduced. Weighted capitation caused greater shifts in resources between districts than had occurred at regional level. Providers in districts that lost a substantial amount of resources had to implement cost cutting strategies, for example reducing the numbers of acute beds.

Within the first four years a number of structural developments took place aimed at increasing efficiency by advancing the creation of the health care market (Figure 2.4). The introduction of contracting had caused a number of problems for DHAs mainly because most DHAs were too small to form viable purchasing units and because they lacked the appropriate purchasing skills. Many DHAs therefore decided to purchase health care services jointly with other DHAs. A series of mergers subsequently took place forming a smaller number of purchasing agencies.

Figure 2.4: Financing of the NHS post-reforms (1995/96)



NHSE HQ=National Health Service Executive Head Quarters, DHAs=District Health Authorities, FHSAs=Family Health Service Authorities, GPs=General Practitioners

By April 1994 the process of transforming the hospital and community service provision was almost complete with about 90% of hospital and community health service spending being used to purchase services from around 400 NHS Trusts. In theory this should have had the effect of promoting greater competition between providers as it reduced the chance that a purchaser would favour their own DMU. The degree of competition was also enhanced by the increasing number of GPFHs and the abolition of SHAs (in April 1995). By 1994 the number of GPFHs increased to about 8,000 general practices serving around 36% of the population. There was however no prospect of all GPs becoming fundholders because some did not qualify (for example, single-handed practices) and some did not want to participate in the scheme.

Provider units rapid uptake of Trust status caused a number of administrative changes. NHS Trusts were not accountable to the RHA. Instead the NHSME set up a number of regional outposts to supervise them. As it became apparent that most provider units would eventually become NHS Trusts the role of the RHA was put into question. The government decided to make two administrative changes. First, to abolish RHAs in favour of a smaller number of middle tier organisations which combined the roles of RHA and outposts and second, to merge FHSAs and DHAs. The merger of FHSAs and DHAs had been expected due to previous confusion over the responsibility for primary health care between the two authorities. From April 1996 DHAs and FHSAs will be merged to form new, unified, commissioning bodies.

2.5 Other policy changes

There were several other policy changes which took place at around the same time as the implementation of the 1991 NHS reforms that were of relevance to the subject of this thesis. First, the publication of 'The Health of the Nation; a Strategy for Health in England' [11] marked a shift in policy intent from a concern about health care to a concern about better health. The document outlined key areas where health improvements could be made. They included coronary heart disease (CHD), cancers, mental illness, HIV/AIDs and sexual health, and accidents. Objectives and targets were set for purchasers to achieve in these areas through the contracting process. The relevant targets concerning CHD are outlined in Table 2.2.

Table 2.2: Specific targets relating to coronary heart disease

Prevention	Treatment
Reduce rates for CHD in people under 65 by at least 40% by the year 2000	By 1997 all emergency ambulances should have at least one paramedically trained crew member
Reduce rates for CHD in people aged 65-74 by at least 30% by the year 2000	To achieve a target of "door to needle" time (for intravenous thrombolysis in suspected acute myocardial infarctions) following arrival at hospital of 30 minutes

Second, the Government's strategy of shifting the emphasis of health care from hospital to community based services led to a review of London's acute hospital capacity in 1992 by Sir Bernard Tomlinson. He recommended that there should be a substantial reduction in hospital capacity in London which would release resources

to be used to build up London's primary care base [12]. As the Tomlinson report offered little guidance about how to carry out the recommendations, a team were appointed in 1993 to review acute services and put forward recommendations about how they should be rationalised. The team, known as the London Implementation Group, conducted a series of studies into six specialities (including cardiac surgery) where rationalisation was thought to be necessary. The Group concluded that there were too many small specialist units in London and that improvements in the quality and efficiency of services could be achieved by shutting down a number of units and merging others. Implementation of these recommendations was to be largely through the market place. Indeed purchasers had already started to shift their contracts from inner to outer London providers as a result of the Tomlinson Report. Similar reviews took place in other major cities throughout the UK.

Finally, in 1991, the Patient's Charter [13] was introduced which outlined the rights of NHS patients (Table 2.3). In addition to these rights the Government also included their commitment to setting specific service standards in the form of maximum waiting times for out-patient services and for specific elective procedures. The Secretary of State for Health [14] announced in April 1994 a standard for patients requiring coronary revascularisation, of admission within 12 months of being placed on an inpatient waiting list. This standard was applied from April 1995 in addition to a guarantee of admission within 18 months for all specialities and a standard for first outpatient appointments that will require 9 out of 10 appointments to be within 13 weeks of GP referral and all to be within 26 weeks of referral.

Table 2.3: The Patient's Charter Rights

1.	To receive health care on the basis of clinical need, regardless of ability to pay
2.	To be registered with a GP
3.	To receive emergency medical care at any time, through your GP or the emergency ambulance service and hospital accident and emergency departments
4.	To be referred to a consultant, acceptable to you, when your GP thinks its necessary, and to be referred for a second opinion if you or your GP agree this is desirable
5.	To be given a clear explanation of any treatment proposed, including any risks and any alternatives, before you will agree to the treatment
6.	To have access to your health records and to know that those working for the NHS are under a legal duty to keep their contents confidential
7.	To choose whether or not you wish to take part in medical research or medical student training

2.6 Summary

Reform of the NHS in 1991 was brought about by a growing concern regarding the financing of the NHS. It was the provision of health services however, that became the subject of major reform rather than the method of funding the NHS. A competitive market was created on the supply side within the framework of public finance by separating the responsibility for purchasing and providing health care. The aim was to encourage competition between existing providers for contracts offered by purchasers of health care. The introduction of market mechanisms occurred in stages alongside other policy changes which aimed to shift some resources to primary care services and to give patients more rights regarding the quality of the health care they

received. In order to assess what impact these reforms have had it is necessary to outline the assessment criteria to be used, the subject of Chapter 3.

CHAPTER 3

WELFARE ECONOMICS

AND

THE ASSESSMENT CRITERIA

3.1 Introduction

The fundamental economic problem faced by society is how best to allocate resources given that there are not enough to satisfy all needs. Such scarcity implies that any change in resource allocation will take into account opportunity costs[2]. For example, if the government chooses to devote more resources to health care then there will be less for other services. There are many different opinions on how society's resources should be divided between the various services. The fundamental goal of any health care system is to maximise social welfare, that is, to allocate resources efficiently. Not surprisingly, the idea of increasing efficiency was behind the introduction of market mechanisms into the NHS. It was and remains the Conservative government's belief that market mechanisms, if regulated appropriately, will produce a more efficient allocation of resources than central planning.

Welfare economics is a branch of economics which is concerned with the optimal allocation of society's resources. To assess whether the changes brought about by the 1991 NHS reforms will lead to improvements in social welfare, it is necessary to identify criteria against which the changes will be measured. Welfare economics has a long tradition of considering social welfare as having two dimensions, those of economic efficiency and distributional justice (equity). It is these criteria that were adopted for the purposes of this study.

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[2] An opportunity cost is a measure of the economic cost of using scarce resources to produce a particular service in terms of the alternatives thereby forgone.

This chapter will (1) describe how economists propose to measure changes in social welfare brought about by a reallocation of resources, (2) assess the welfare objectives of economic efficiency and distributional justice in relation to health care, concluding with operational definitions of the two objectives, (3) discuss the theory of markets and market failure in health care and (4) review the literature assessing the impact of introducing markets into health care on the objectives of efficiency and equity.

3.2 Measuring changes in social welfare

3.2.1 Economic efficiency

The aim of government policy is to maximise social welfare, which implies that resources should be allocated efficiently. In welfare economics, the generally accepted definition of efficiency is that of Pareto optimality, named after the Italian economist, Vilfredo Pareto, who constructed the model. He argued that any reallocation of resources could be considered an improvement if it made some people better off without making anyone else worse off. A Pareto optimum exists at a point where it is impossible to make one person better off without simultaneously making another worse-off. There are many Pareto optimum points associated with different distributions of initial endowments. The major problem with this concept is its limited applicability to most policy proposals which benefit some individuals and harm others in the pursuit of increasing social welfare.

To overcome this problem, Kaldor and Hicks [15,16] introduced a test of relative

efficiency known as the compensation principle (or the potential Pareto improvement criterion). The compensation principle proposes that if a policy creates winners and losers the policy would be acceptable if the end result was an overall increase in social welfare. Hypothetically, it would be possible for the gainers to compensate the losers and still come out ahead. Consider a policy which set out to build a new hospital which would change the state of the world from State 1 to State 2. The new hospital, according to the compensation principle would increase efficiency if the increase in welfare in State 2 could be redistributed in such a way that the total welfare of all individuals would be at least equal to the total welfare of individuals in State 1 and for one or more individuals it would be greater.

The compensation principle is the main analytical tool in applied welfare economics. However, it is not possible either to measure or to compare individual welfare simply because it is not possible to identify the relative satisfaction levels of each individual. There is no meaningful scientific way to measure or compare the relative satisfaction levels of an individual receiving a hip replacement with one receiving a heart transplant. How then can the principle be used to judge changes in resource allocation brought about by government policy? Hicks and Kaldor proposed that monetary values could be placed on individual's welfare which is both measurable and comparable. This is the foundation of cost benefit analysis (CBA).

CBA aims to assess the effects of policy changes on the welfare of society as a whole. Fundamental to the approach is the concept of cost. The costs of a policy change that CBA attempts to measure are the opportunity costs which are the value of the

resources forgone by not using them in the best alternative activity. The relevant costs are therefore those that are incurred by the change in resource allocation and those that would not be incurred if no change in resource allocation took place.

Willingness to pay can be used as a method of deriving monetary values. Benefits can be expressed as the amount individuals are willing to pay for the results of a proposed policy and costs can be expressed as the amount they are willing to pay for the benefits forgone as a result of the proposed policy. These costs and benefits are summed to produce a social cost and a social benefit. If the net social benefit is positive the proposed policy should be implemented. Measurement of individuals' willingness to pay is predominantly through market prices. However, where market prices do not directly reflect individuals' valuations then other methods have to be used. For example, extending Heathrow's permitted flight times will make quietness less available for those living near the airport, however there is no market for quietness and therefore no market price for it.

There are some limitations to cost benefit analysis which should be noted. First, it is argued that individual valuations (or preferences) of policy changes cannot be summed to produce an aggregate valuation (social preference) [17]. Second, it is difficult to quantify all aspects of welfare. For example, can a monetary value be put on human life? Third, because it is based on the existing distribution of resources within society regardless of whether it is considered equitable, individual valuations may not always be appropriate. For example, consider a policy aimed at providing a breast cancer screening service. Just because a rich person may be willing to pay more for the

service than a poor person it should not mean that providing a breast cancer service for the rich is of more value than providing it for the poor. CBA therefore cannot tell us anything about the value of distributional effects of a policy change.

3.2.2. Distributional justice

Distributional justice, or equity, is often defined as fairness in the distribution of goods and services among the people in an economy. However, there is no unique definition of equity. It is an ethical judgement and the means of achieving it differ with the theory of justice a government supports. (It is not possible to discuss these theories here as they would take up a separate thesis on their own). Cost benefit analysis, as outlined above, tells us little about the distributional effects of policy changes in an economy. It's use should be restricted to determining what policies offer the greatest efficiency gains and leave the judgement of distributional justice to be made separately by the decision-maker (government).

Trade-offs may have to be made between the two objectives. A policy may be shown to cause a decrease in economic efficiency. Under the cost benefit criteria the policy should not be implemented. However, if the decrease in economic efficiency is outweighed by an improvement in distributional justice, implementation of the policy may be justified. Alternatively, if a policy caused an increase in economic efficiency but a decrease in distributional justice the decision-maker would have to make the choice between more/less efficiency for less/more equity.

The objectives of economic efficiency and distributional justice will now be defined in the context of health care in order to develop operational definitions that can be used to judge the effect of the reforms.

3.3 The assessment criteria

3.3.1 Efficiency

There are two levels of efficiency, productive and allocative efficiency. Productive efficiency addresses the issue of how an intervention (of proven effectiveness) can best be provided so as to achieve maximum output for a given level of resources. A process is said to be efficient in the productive sense if it is impossible to produce the same output using fewer inputs or if it is impossible to produce more output using the same level of inputs.

Allocative efficiency addresses the issue of how best scarce resources are allocated between various effective and productively efficient interventions. It therefore focuses on the optimal configuration and scale of services in order to maximise the potential gains in health of society as a whole. Services are considered worthwhile if the benefits exceed the costs and should be implemented and expanded up to the point where marginal benefits equal marginal costs[3]. As this thesis assesses the impact of the reforms only on one specialist service, the definition of allocative efficiency

[3] Marginal costs/benefits relate to the incremental costs/benefits of an intervention. They measure how *much* of an intervention is worthwhile.

adopted relates to the optimal spacial distribution of this service. To achieve allocative efficiency would therefore require coronary revascularisation procedures to be expanded in all areas to the point where marginal benefits equal marginal costs. The question of whether coronary revascularisation services are considered worthwhile relative to other interventions will not be addressed in this thesis.

3.3.2 Equity

Equity can be considered both at the level of financing health care services and at the level of provision. Presently a significant measure of financial equity is achieved by funding the health service from general taxation and, since the 1991 NHS reforms did not change the way the NHS was financed, the merits of this method of achieving financial equity will not be discussed. The reforms, however, did change the way in which health care services are provided. At the level of provision situations in which there are grounds for making trade-offs between equity and efficiency are rare. There are few circumstances where more equity is accepted for less efficiency as this will mean less extension or improvement in quality of life. In addition, it is common for situations which appear inequitable also to be inefficient. In such situations a redistribution of resources to achieve maximum gains in health at least cost will improve both efficiency and equity. For these reasons equity was not adopted as an explicit criterion in this thesis. Thus, while the possible effects of the reforms on equity will be described, the focus of this thesis will be on efficiency.

In order to describe the distributional aspects of the reforms a definition of equity is required. There are two types of equity, horizontal and vertical. Horizontal equity is about the equal treatment of equals and vertical equity is about the unequal treatment of unequals. Vertical equity, although an appropriate concept in the provision of health care, is difficult to measure. It requires judgements to be made about how unequally patients with different diagnoses should be treated. Horizontal equity is a more practical concept. The equal treatment of equals can be defined as equal treatment for equal need[4]. It can be expressed as equality of health, resources, utilisation or access.

The idea of using equality of health as an equity goal can be rejected as it could never be guaranteed or achieved. For example, diseases which have been inherited would make it impossible to achieve this equity goal. Equal expenditure for equal need is of limited use as it only describes resource use rather than what services were received or how those services affected health status. Equal utilisation for equal need relies on standardisation of medical practice for a given condition and on equal patient compliance. As clinical practice for any condition varies between practitioners and patient compliance cannot be assumed to be the same for all patients, the use of this concept to describe the equity effects of the reforms is also limited. Equal access for equal need does not have these problems as it simply refers to individuals having an equal opportunity to use the services they need. Equal access for equal need is measured in relative terms. In this study the aim was to assess whether access had

[4] Need can be defined as the populations ability to benefit from an element of health care [18].

changed since the 1991 NHS reforms. Measures of access included geographical distance and waiting times.

3.4 Markets

The British government introduced market mechanisms into the NHS because it believed that appropriately regulated markets achieve a more efficient allocation of resources. Economic theory does indeed state that a perfectly competitive market will reach a Pareto-efficient allocation without the need for government intervention.

A market is where goods and services are exchanged between consumers (demand side) and producers (supply side). A market equilibrium is reached when, at a given market price, producers maximise their profits by selling as many products as they desire at that price and consumers maximise their welfare by purchasing all the products they desire subject to their income constraint. Price has an important part to play in this process. Price is determined by the interaction of supply and demand and is the information used both by consumers and by producers when making decisions. Price acts as a signal to both sides of the market. Producers use it to determine the level of output and consumers use it to determine at which level to purchase.

Under the model of perfect competition, goods and services are exchanged costlessly through the market via price signals without the need for government intervention or central regulation. The idea that, under certain ideal conditions, markets will achieve

an economic efficient allocation on their own, was proposed by Adam Smith, the eighteenth century economist. He stated:

"*Every individual....generally....neither intends to promote the public interest, nor knows by how much he is promoting it. By preferring the support of domestic to that of foreign industry he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention*" [19]

He claimed that prices act as an invisible hand which guide consumers and producers to an allocation of the economy's resources that is Pareto-efficient. Markets however will only achieve an efficient allocation of resources if certain ideal conditions exist. First, consumers and producers are price takers, which means that there are a large enough number to prevent any from affecting the market price by their own actions. Second, the service is homogenous, that is producers supply a reasonably standard product. Third, there is perfect information on the part of the consumer as to the quality and price of the services provided and the options available. Finally, there exist no barriers to market entry or exit so that there are no incentives for existing producers to collude.

The question that remains is, do these ideal conditions hold true for health care markets? The simple answer is no. Thus, an unregulated market in health care will deviate from first-best allocations. The need for government intervention in the

market for health care to achieve second-best allocations can therefore be justified purely on economic grounds as Barr (1987) stated:

"*[Government intervention] does things which private markets for technical reasons either would not do at all or would do inefficiently. We need a welfare state of some sort for efficiency reasons, and would continue to do so if all distributional problems had been solved*" [20].

The technical reasons that Barr was referring to are the sources of market failure. They can be divided into two groups, the lack of the preconditions required to achieve market efficiency and weaknesses inherent in the market.

3.4.1 Lack of preconditions

(a) Information asymmetry.

Consumers do not have perfect knowledge either about their own health care needs or about the most efficient way there is of meeting those needs. Indeed, in health care, it would be inefficient for consumers to pursue perfect knowledge given the complexities and size of the medical information required to make a rational decision. Consumer choice would therefore be inefficient. However, the ignorance brought about by imperfect information is a characteristic of the consumer (the patient) not the producer (the practitioner). Practitioners therefore act as an agent on the patients behalf. If practitioners were perfect agents there would be no need for government regulation because practitioners would supply patients with all the relevant information

necessary for the patient to make an informed choice which would maximise their own welfare. There is evidence, however, that practitioners are not perfect agents [21], a fact that will cause an inefficient allocation of resources. There are two reasons why practitioners are not perfect agents. First, they have their own welfare function to maximise which may be in conflict with their patients. Second, they are not perfectly informed about the patient's health status or about the treatment options available.

(b) Natural monopoly.

Perfect competition requires producers to compete with each other on the basis of price. This conditions breaks down in health care where there are only a small number of producers who can affect the market price, known as a natural monopoly (that is, economies of scale can sustain only a small number of hospitals in the market). This can lead to high prices and inefficiency.

(c) Barriers to market entry.

In order to practice within health care a license must be obtained. This prevents unqualified practitioners from entering the market. If no such regulation existed unqualified practitioners would be allowed to practice, which could or would result in serious mistakes. This is further constrained by the existence of the medical profession who are able to control the market by limiting the number of entrants to their profession.

3.4.2 Weaknesses in the health care market:

(a) Externalities.

Externalities are the consequences, adverse or beneficial, of actions taken by individuals on others which are not accounted for in the market. A beneficial externality, for example immunisation, will benefit individuals other than those immunised because it will protect them from communicable diseases (an external benefit). However this external benefit is not taken into account in the market, which considers only private costs and benefits. Beneficial externalities will therefore be undersupplied. Adverse externalities, on the other hand, impose external costs on society which are again not taken into account in the market place. For example, a producer of a good that creates large quantities of pollution will sell the good at a price that does not include the external cost of those affected by the pollution. If this cost were taken into account in the price, less of the good would be produced. Adverse externalities will therefore be oversupplied in the market place. There are potentially a number of beneficial externalities in health care because people benefit from other individuals' consumption of health care. For example, consumption may prevent the spread of disease (a selfish externality) and some individuals would be willing to pay for poorer or sicker individuals to consume health care (a caring externality). A market will not take into account individuals' willingness to pay for these external benefits and this, therefore will lead to an undersupply of health care. Government intervention is required to take account of all costs and benefits, thereby maximising social welfare.

(b) Uncertainty.

Consumers are uncertain as to when they will get ill, what type of health care they will need and how much that health care will cost. The market solution to risk is insurance. The problem however is that health care insurance markets fail for two reasons, moral hazard and adverse selection. Moral hazard relates to the reckless behaviour of individuals brought about by insurance. Insured individuals face no direct costs of consuming health care as it is free at the point of use. This can lead to overconsumption of scarce resources and therefore high social costs.

Adverse selection results from lack of information and information asymmetry in the insurance market. The insurance company is not aware of the risk category of the buyer and therefore will set a premium reflecting the 'average' risk level of the insured population. The low risk individuals will consider this premium as being too high and will therefore not take out insurance. This will cause the average risk of those insured to rise, and therefore the premiums to rise which will force lower risk individuals out of the insurance market. This process will continue, causing all the 'best' risks to be selected out of the insured group. Again the market has failed to allocate health care resources efficiently [22].

Given that markets fail to allocate resources efficiently in health care what is the most efficient way to organise health care: through the market; through central regulation; or a combination of both? Donaldson (1993) states:

"The basic reasoning underlying ***extensive*** *government intervention in health care, however, is that none of the ideal assumptions of perfect markets work in the case of health care. Thus, market failure in the allocation of health care is so complete that extensive government intervention is more likely to result in the achievement of societal objectives than are market forces supplemented by minimal government intervention"* [23].

The answer appears to be to maximise government intervention and minimise market forces. Countries do, however, differ in their opinion as to the extent of government intervention. Some countries have opted for public production of health care which to a large extent supersedes the market. Others have opted for subsidies which aim to correct market failure but allows the market still to operate. Before the 1991 NHS reforms, the health service was financed and provided as a public institution. This protected individuals from imperfect knowledge by the provision of services free at the point of use, provided by informed practitioners paid by the government and therefore having no incentives to overtreat. With the 1991 NHS reforms, the financing of health care is still provided publicly largely through general taxation but market forces have been introduced into the provision of health care. What effect has this had?

3.5 Economic evaluation of the reforms

While the theoretical literature on the potential effects of introducing provider competition on the efficiency and equity of health care systems is extensive, empirical evidence is largely lacking despite the 1990s becoming the decade for radical health care reform in many industrialised nations [24]. This is predominantly due to the difficulty of evaluating the effects of provider competition in the short-term. It is considered that in order to assess the impact on efficiency and equity a longer-term perspective is required. In addition, the British government has hindered evaluation of the reforms. They not only introduced provider competition into the NHS without piloting it first but they also denied the need to set up national monitoring systems to evaluate systematically the reforms.

It is not surprising therefore that when market forces were introduced into the NHS it provoked a wide ranging debate. Some observers suggested that if the environment was one of managed provider competition and the right balance between competition and regulation was struck then efficiency and equity would be enhanced [25-29]. Others contradicted this tenet, stressing that a health service which combined characteristics of a market with those of central regulation risked getting the worst of both worlds [30,31]. Others highlighted the fact that the characteristics required for a competitive market were not likely to be found in health care, and that therefore the theoretical benefits of increased efficiency brought about by a market-based system would not accrue [32-36]. They criticised the way in which the theory of provider competition was translated into the health care system. The speed of implementation

was thought to be over-ambitious and the lack of experimentation harmful.

The reason for such diverse opinions has partly been the lack of empirical evidence. Results of studies evaluating the reforms started to emerge only two years after their inception and, inevitably, many reported little actual change [37]. The evaluations of the reforms that have been carried out to date will now be reviewed, from the point of view of assessing the effect of introducing provider competition on productive efficiency, allocative efficiency and equity.

3.5.1 Productive efficiency

One of the primary objectives of the reforms was to increase competition between providers in the hope of obtaining services at reduced cost. It was envisaged that the necessary incentives to improve efficiency would be brought about by the separation of responsibility for purchasing (demand side) and providing (supply side) health services [38]. Prices would act as a signalling devise to both purchasers and providers, as in all markets, to determine the optimal allocation of society's resources. Prior to the implementation of the reforms there were large variations in the use of beds and other resources [39]. The potential for achieving efficiency gains through the contracting process was therefore thought possible [33]. However, any potential for enhancing productive efficiency seem to have been counterbalanced by market failures and the government's misguided attempts at regulation [40].

As stated above, there are various forms of market failure in health care which prevent the optimal allocation of health care resources including imperfect competition, imperfect information and barriers to market entry and exit. Productive efficiency will only increase if relatively high cost providers face the necessary incentives to improve their cost-effectiveness. In a perfectly competitive market this is achieved by the existence of a large number of buyers and sellers, none of whom can control the market price. However, in the NHS local monopolies may exist because of traditional NHS service planning, which was deliberately designed to avoid the duplication of services and take advantage of economies of scale.

Despite the characteristics of perfectly competitive markets not being present in health care, Baumol has suggested that the benefits of perfect competition could still be achieved if the market was at least contestable [41]. A contestable market is one where there is a potential threat of new entrants into the market. It was considered unlikely that contestability exists in health care markets because of the presence of large sunk costs[5], specific assets[6] and associated set-up costs which create barriers to market exit and entry [42,43]. It has been suggested that a way around this problem would be to apply the concept of contestability to hospital management teams rather than the hospitals themselves. Contracting would take the form of bidding for a franchise to run the hospital, though this could have a disruptive effect on clinical staff and long-term patient care if there was a high turnover of management teams [43].

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[5] Sunk costs are any expenditure on inputs, such as machinery, which are irretrievable. They cannot be used for any other purposes or easily resold.

[6] Specific assets are defined as those assets which are to a large degree non-redeployable and therefore cannot be used for other purposes.

It was assumed that for provider competition to be successful in enhancing productive efficiency purchasers must be able to make cost and quality comparisons between providers to ensure providers are operating efficiently. Those who are operating inefficiently and charging an excessive price for their services will be forced out of the market. However, information on the costs, quantity and quality of the service required for the contracting process to work effectively is far from complete. If purchasers cannot distinguish an efficient provider from an inefficient one through data on costs and quality then there is scope for providers to cut costs at the expense of quality [43].

The government recognised that the health care market was unlikely to enhance productive efficiency without some form of government intervention. They decided that the best way to control for monopolistic tendencies in the health care market and the lack of accurate information was to set a number of guidelines around the costing and pricing of contracts [44-48]. They imposed several regulations on the market. First, NHS providers were to be non-profit-making organisations and were therefore governed by an explicit break-even constraint. Second, NHS providers were subject to the requirement that contract prices must equate with average cost.

These rules aimed both to prevent providers from making excess profits and to improve the quality of information by standardising cost accounting procedures used in setting prices. However, it was argued by Dawson (1994) that the government had set regulations that were not appropriate to health care markets [49]. She stated that the framework chosen '*is one of suppliers setting unique prices for each procedure*

and buyers choosing the quantity to purchase at that price. This model is appropriate in markets with large numbers of buyers who are price takers. This is clearly not the type of market to be found in the NHS and it is doubtful if regulators could enforce behaviour that is so contrary to the incentives generated in competitive markets with small numbers of participants'. It was also argued that if providers were in a monopoly position in the market then the regulation would do nothing to prevent providers from internalising any surpluses in the form of inefficiencies (X-inefficiency), for example inefficient management of resources. Incentives to enhance productive efficiency would therefore be absent [50].

The existence and measurement of the extent of monopoly power therefore became a crucial issue. One method used by the National Association of Health Authorities and Trusts to assess market structure was the Herfindahl-Hirschman Index [51,52]. They applied this index to general surgery in the West Midlands and found that the market was far more competitive than had been expected. General surgery is, however, universally provided in all acute general hospitals. The extent of competition for a speciality like cardiac surgery which is provided only in a small number of tertiary centres cannot be expected to be as high. Edwards and Townsend (1980) suggested the need to define the degree of market concentration for each service rather than for the provider as a whole [53]. Instead of providers not facing the threat of potential new entrants, due to large sunk costs and set up costs, there may be a threat from those providers setting up alternative services. They would be a substitute for rather than complementary to services provided by existing providers, such as GPs offering primary care based services.

Observers of the reforms reviewed the impact of other factors which may have affected productive efficiency in the NHS. These included the problems of clinical compliance and the lack of contractual obligations. It was envisaged that clinical decision-making and compliance with the contracting system would determine productive efficiency [32]. The Resource Management Initiative and the growth of medical audit were thought to be central to achieving greater awareness in practitioners regarding the costs and benefits of their clinical decisions and in this way efficiency would be increased.

The fact that contracts are not legally binding has been argued to be a severely debilitating factor in the pursuit of greater efficiency [30] as it can lead to opportunism [54]. One survey showed that 38% of DHAs renegotiated contracts because hospitals over-performed [52]. Another found that in 90% of contracts, actual volumes varied from contracted volumes. In those that over-performed 72% renegotiated the contract [10]. The lack of contractual obligations can lead to either side trying to '*game the system*' which is made possible because of the existence of information asymmetry. Providers are able to select patients who are low risk and therefore low cost. Purchasers can refer high risk (and therefore high cost) patients to providers within block contracts. There are many other forms of opportunism. Providers can attempt to shift costs from competitive services (e.g elective surgery) to non-competitive services where costs are guaranteed (e.g accident and emergency services). Providers also have the incentive of using services for which they enjoy a monopoly to cross-subsidise other less profitable, competitive services. The lack of adequate monitoring makes these 'illegal' manoeuvres possible.

One solution to this problem pursued by the government has been the development of a system for coding and pricing groups of treatments. The National Casemix Office has developed a set of Healthcare Resource Groups (HRGs) which group data on treatments into comprehensive "iso-cost" packages of care. By 1997 all DHAs should be pricing specialities at HRG level and this will allow a more accurate understanding of providers' service costs. The danger of shifting costs would however still exist in the form of HRG creep, which would involve the provider shifting the patients to the most profitable category.

3.5.2 Allocative efficiency

The reforms sought to improve allocative efficiency by separating purchasing from provision. Many of the issues discussed above regarding market failure hindering the achievement of greater productive efficiency will also impede improvements in allocative efficiency. For example, the potential existence of monopoly providers and the lack of comparative price and quality information will cause market prices to become distorted. Purchasers will not therefore be in a position to choose the most efficient provider. Under these circumstances prices cannot act as a guide for determining an optimal allocation of health care resources.

The reforms, by separating purchasing from provision and by allowing GPs to hold budgets, created a purchasing function that encouraged concentration on the health needs of the population. This, it was argued, would make resource allocation

decisions more explicit and would make purchasers more critical about the care they bought [33]. An improvement in allocative efficiency was thought to be possible if purchasers were successful in avoiding 'bad buy's (health care which is inappropriate) rather than avoiding 'bad risks' (health care which is expensive) [32]. However, the reforms created a system which was initially concerned largely with cost, in which the scarcity of resources became more apparent. In theory, the incentives to avoid 'bad risks' was high, especially in the case of GP fundholding [55]. A recent study concluded, however, that there was no evidence of GPFHs only accepting healthier patients on to their practice lists (cream skimming), mainly because they are not responsible for paying for treatments which exceed £6,000 [56].

Improvements in allocative efficiency require a redistribution of resources to achieve greater improvements in health with the limited resources available. However resources are largely immobile. If a purchaser switches a contract for a particular service from one provider to another, it reduces the workload in the initial provider which can have the effect of raising the average cost [57]. In one example when non-local purchasers decided to place their contracts elsewhere, average costs in the local provider escalated and the financial viability of the service was jeopardised, even though local purchasers were still having to use the service due to a lack of alternative providers [58].

3.5.3 Equity

Improving equity was not one of the explicit objectives of the reforms. It was intended that the introduction of provider competition would improve equity indirectly by increasing efficiency and by tailoring services to population needs. There is little evidence to suggest that greater equity has or will be achieved.

The fundamental equity problem that has arisen is due to GPFHs. Providers have found it increasingly difficult to treat patients equally on the basis of clinical need. For example when funds for block contracts have been exhausted and cost and volume contracts completed, providers have found they were unable to treat those patient on the waiting list even if they had a high clinical urgency, but they were able to treat patients in less need who came from GPFHs or purchasers whose contracts were not yet completed [59]. This then seems to have created a system where access is on the basis of ability to pay not on the basis of clinical need. As resources could be redistributed to produce greater health benefits, this problem is one of efficiency as well.

3.6. Summary

Welfare economics provides valuable insights into the optimal allocation of resources. It considers social welfare as having two dimensions, those of economic efficiency and distributional justice. These two criteria involve predicting or analysing how changes

in resource allocation brought about by government policy effects social welfare. It is these criteria that were adopted in this study to analyse the effect of the reforms (Table 3.1). Predominantly, the analysis is concerned with efficiency, both productive and allocative. Equity, in terms of equal access for equal need, is used to describe the distributional aspects of the reforms. However, in situations where equity is found to be a concern, the concern is also an efficiency one and involves no trade-offs between the two objectives.

Table 3.1 : THE CRITERIA

(1) **Assessment Criteria**	**Efficiency**
• Productive efficiency:	Coronary revascularisation services should be provided so as to achieve maximum output at least cost.
• Allocative efficiency:	Coronary revascularisation services should be expanded in all areas to the point where marginal benefits equal marginal costs.
(2) **Descriptive Criteria**	**Equity**
• Horizontal equity:	Coronary revascularisation services should be provided so as to achieve equal access for equal need.

A perfectly competitive market would achieve an efficient allocation of resources under certain ideal conditions. However, as these conditions do not exist in health care markets, first-best allocations cannot be achieved. Sources of market failure include information asymmetry, natural monopoly, barriers to market entry, externalities and uncertainty. Government intervention is therefore required to correct for these market failures in order to achieve second-best allocations. Although there is an abundance of literature assessing the potential effect of the reforms on efficiency and equity there are few empirical studies. This thesis aims to start to fill this gap by applying these criteria to empirical evidence on one specific area of health care, coronary revascularisation services.

CHAPTER 4

CORONARY REVASCULARISATION PROCEDURES

4.1 Introduction

Coronary artery bypass grafting (CABG) and percutaneous transluminal coronary angioplasty (PTCA), known collectively as coronary revascularisation procedures, are the two invasive interventions for coronary heart disease (CHD). The objectives of this chapter are to: (1) outline briefly the epidemiology and cost of CHD; (2) describe the trends in the provision of CABG and PTCA and explore the reasons behind those trends; (3) assess the need for revascularisation services; (4) review the literature on the effectiveness and cost effectiveness of CABG and PTCA; and (5) discuss the recent developments in monitoring outcomes and improving the quality of patient care.

4.2 Epidemiology and cost of CHD

CHD is a major cause of mortality and morbidity in England. In 1991 it accounted for 149,498 deaths in England and Wales, being 27% of annual mortality from all causes. Although the death rate from CHD has been declining slowly since the early 1970s, the greatest reductions being amongst men aged between 45 and 50 [60], it remains one of the highest in the world [61].

The Welsh Heart Survey and the British Regional Heart Study estimated that 25% of middle-aged men show some evidence of heart disease, amounting to 1.74 million cases under the age of 65 in England & Wales [62]. The prevalence of CHD in women is approximately the same as that found in men ten years their senior [63].

For purchasers, CHD comes high on the public agenda as the burden of CHD spans both the primary care and hospital sectors. In a typical district, with a population of 500,000, there will be at least 1,275 acute myocardial infarctions and 5700 patients presenting with angina per year, 8-13% of whom will be referred by their GP to a cardiologist. A total of 600-900 patients will be assessed by cardiologists as potentially suitable for coronary revascularisation and approximately 540 angiograms, 75 PTCAs and 150 CABGs will be undertaken [64].

The cost of CHD is considerable. Service provision for CHD spans a broad range of areas including specialist cardiologist services, inpatient and outpatient hospital care, general and paramedical services, and continuing care facilities. It also impinges on primary care and community care services. In terms of direct health service expenditure 2.5% is spent on cardiovascular disease [65] with an estimated £500 million (in 1987) attributable to the treatment of CHD per annum [66].

Treatments for CHD are costly. CABG and PTCA have been costed at £7685 and £6208 respectively over two years (1993/94 prices) [67]. Demand for these procedures is continuing to rise [68,69], despite the fall in the prevalence of CHD. If these trends continue, treatments for CHD will constitute an ever increasing proportion of purchasers' budgets.

4.3 Trends in provision

CABG was introduced by Favaloro in 1967 and has been the main surgical treatment of CHD since the 1970s [70]. The aims of the intervention are to prolong life, prevent myocardial infarction, relieve angina and improve quality of life. The technique involves using part of a vein or artery from elsewhere in the patient's body to bypass an arterial constriction with the aim of complete revascularisation of the myocardium. Vein grafts are limited by the high rate of occlusion in the grafted vessels. Arterial grafts, which are associated with reduced rates of occlusion, are used more frequently now.

PTCA is a relatively new intervention which is rapidly evolving and was developed by Andreas Grüntzig in 1977 as an alternative to bypass surgery in patients with less severe disease [71]. The procedure involves penetration of the skin (percutaneous), passing a catheter along arteries (transluminal), and moulding of the vessel constriction (angioplasty) for the purpose of improving the blood flow in those arteries thickened with atherosclerosis. It became accepted as part of routine clinical practice in the UK in the late 1980s and is increasingly favoured over CABG for treating some types of angina because its less traumatic, has a better recovery response, and a lower initial cost. PTCA should only be performed when and where surgery is immediately available.

Utilisation rates for CABG and PTCA have increased dramatically since they were first introduced and wide international and national variations have been found. In the

USA the rate of CABG per million population increased from about 700 in 1981 to over 1,000 in 1990. In 1990, the Canadian rate was about half the US rate [72]. In the UK the rate is much lower having risen to only 278 per million by 1990 [73] from a rate of 107 per million population in 1982 [74]. These marked international differences also apply to PTCA. In 1985 the rate of PTCA in the US was 452 per million compared to only 29 per million in the UK [75]. The UK rate rose to 168 per million by 1991 [76] while the US rate increased to 1,317 per million [64]. Rates in other European countries lie between the US and UK rate. Wide variations have also been demonstrated between regions of the United Kingdom [74,75], and within North America [72,77,78]. It should be noted that many of these studies were inexact as they did not identify patient flows outside the defined area of study or did not take private and non-resident use into account, as the routine information systems did not include these data.

4.3.1 Reasons for an increase in demand

There are a number of possible explanations for the increase in demand for coronary revascularisations. First, with the diffusion of more advanced techniques and an increase in operator skill, which has resulted in lower operative mortality and morbidity, clinicians are now performing revascularisations on patients who would have previously not been considered suitable for surgery. More elderly and more female patients are being referred [79]. The interventions have also been extended to include patients with more severe disease [80,81].

Second, there has been a trend towards a more rigorous approach to the investigation of patients with CHD using non-invasive techniques resulting in more referrals. The safety of coronary angiography has also been established, creating a greater willingness for physicians to refer patients [82]. Third, although PTCA was introduced as an alternative to CABG there has not been a transfer of patients between the procedures with a subsequent decline in the demand for CABG. There are a number of possible explanations for this. Clinicians are more likely to refer patients for intervention now a less invasive procedure is available than when surgery was the only option [82]. This has contributed to the increase in the rate of coronary angiograms which in turn has identified more patients who would benefit from CABG. PTCA may also have caused an increase in the number of repeat revascularisations because of the problem of restenosis [83,84]. Finally, those patients undergoing PTCA are thought to be those who would previously have been medically managed rather than those suitable for CABG.

4.3.2 Factors causing geographical variations

Reasons for intranational and international variations in utilisation rates include: statistical factors (data inaccuracy, random variation); supply factors (variations in the availability of health care facilities, differences in clinical judgement); and demand factors (differences in the sociodemographic composition of the patient populations, variation in the behaviour of patients). Observed variations suggest that differences in clinical judgement exist and that there only partial consensus regarding criteria for

use of coronary revascularisation procedures. Variations could therefore partly be caused by inappropriate intervention [85].

A method to assess whether inappropriate use of these procedures can explain variations in rates of use was developed by the RAND Corporation in the USA. The method involves applying criteria for the appropriate use of a procedure, that have previously been developed by a panel of physicians and surgeons, retrospectively to cases in specific hospitals or regions. CABG was one of the first procedures for which criteria were derived through this process [86].

Inappropriate use has been found both in areas of high utilisation (America) and low utilisation (Britain). There was, however, a striking difference in the views of doctors in the two countries. British clinicians considered 35% of CABGs done in America were inappropriate whereas US clinicians considered only 17% to be inappropriate [87]. Even in an area of the UK with low activity, inappropriate use was found by both UK and US clinicians (16% and 7%) though the level was much lower than in high rate areas [88,89]. It seems therefore that inappropriate use contributes to but does not account for all the international differences in utilisation rates.

In contrast, studies comparing high and low rate areas within North America have found little difference in inappropriate rates. They concluded that little of the variation in rates could be explained by the level of inappropriate surgery [90-92]. Similar conclusions have been made for other medical and surgical procedures [93-95]. A model put forward by the RAND Corporation based on these results, proposed that

variation in rates could largely be explained by underuse of interventions in low use areas rather than differences in criteria for intervention and inappropriate procedures in high use areas.

The techniques used in these studies have, however, increasingly been questioned [96,97]. There remain a number of unanswered questions as to why revascularisation rates vary, especially in the UK where few studies have been conducted. The use of these procedures is evidently a product of a complex process. Consideration is also needed of all the steps leading up to revascularisation, that is, from the illness behaviour of sufferers and the identification of the disease by general practitioners through angiography to the intervention itself.

4.4 An assessment of need

Several approaches used to determine the need for and hence the appropriate level of revascularisation services shall be discussed. They include angiographic surveys, waiting list censuses, use of appropriateness criteria, consensus conferences and international comparisons.

Determining the need for coronary revascularisation services ideally involves an assessment of the extent of coronary artery disease in a population. However this would require angiographic surveys. Such surveys would be unethical as angiography is an invasive procedure with an associated risk of mortality. An alternative estimation

of need could be obtained from a survey based on non-invasive tests, for example exercise electrocardiograms [98]. This however has not been done in the UK.

Given the difficulty and cost associated with assessing need based on non-invasive tests, a number of other approaches can be used. Studies in other conditions have used waiting lists to indicate the level of need [99]. Clinicians may, however, admit patients to the waiting list who do not need the intervention. This has been demonstrated by the studies done on appropriateness discussed earlier. When using waiting lists there is therefore a need to analyse waiting lists to ensure that only patients who can benefit from treatment are included.

Another approach to determine the right rate of use that has been suggested was to find an area where utilisation was deemed to be appropriate as measured against a defined set of appropriateness criteria [100]. The rate found in this area could be adopted nationally. Surrey, an area of low incidence of CHD, matched these criteria and had a rate of CABG at 470 per million. It was suggested that this be the minimum rate set nationally [79]. The problem with this approach is that appropriateness criteria were not questioned and the definition of need for intervention is dependent of the level of supply of services.

An estimation of need and appropriate level of use can be determined by a consensus conference. This method was used by a King's Fund consensus conference in 1984 to determine a target level for CABG. The process was limited by the lack of data on the epidemiology of CHD. Revascularisation rates in other countries, especially

the US, were considered. A target of 300 CABGs per million was proposed [101] and achievement of this by 1990 was later adopted by the Government [102].

Further analysis of international trends have led to recommendations for the British government to update the current UK target for CABGs and to set a specific target for PTCA. The Third Joint Report from the Royal College of Physicians of London and the Royal College of Surgeons of England estimated an annual requirement of 400-500 PTCAs and CABGs per million [103]. However it was suggested that this figure should apply to CABG, with a need for PTCA in addition [79]. The Fourth Joint Report from the Royal Colleges estimated that this additional requirement should be in the order of 300 per million [104]. Targets set by the professionals do not represent endorsements as the methods by which they were derived can be considered arbitrary. They do however serve as a guide.

4.5 Evaluation of coronary revascularisation procedures

4.5.1 Effectiveness

Three large randomised controlled trials (RCTs) showed CABG to be a highly effective treatment for the relief of chronic disabling angina and for improving long-term survival in patients who had not responded to medical treatment in whom angiograms showed three-vessel disease or disease of the left-main artery. Quality of life was also improved but the risk of an acute myocardial infarction was not reduced [105-108]. A meta-analysis [109] of all appropriately randomised trials of stable

coronary heart disease [105,110-114] confirmed these results with respect to survival by demonstrating that the difference in survival, between those treated medically and those treated surgically, was greater in patients with more extensive coronary artery disease, defined by the severity of the coronary anatomy (left main stem, three-vessel and left anterior descending disease). Other risk factors, including poor left ventricular function, a history of myocardial infarction, a positive exercise test and age, were not found to affect survival separately but in combination they were found to have an effect.

There has only been one major RCT comparing medical therapy with surgical treatment for patients with unstable coronary heart disease [115-117]. It showed that CABG offered more effective relief of angina and improved survival in patients with poor left ventricular function, severe angina at rest and three-vessel disease.

The results of these trials, however, must be treated with caution as they were performed in the 1970s and operative techniques have now changed [118]. The trials were also highly selective about the patients included. Generalising about the results into present day settings is not necessarily appropriate.

Although observational studies are potentially hampered by selection bias they are useful for supplementing the results of RCTs because of their less restricted selection of patients and longer follow-up. One such study [119] reported similar findings to those of the meta-analysis of RCTs. Survival was significantly improved in patients with severe coronary disease (left main stem and three-vessel disease). They also

found that risk factors such as older age, severe or unstable angina, and poor left ventricular function did not individually affect survival but were important considerations when combined into an overall risk. The study also found that results of surgery improved progressively over time due to improved surgical techniques.

The selection criteria and survival of patients receiving CABG compared to those receiving medical therapy in the RCTs and the observational study are summarised in Table 4.1. The general conclusions which can be drawn are that it is likely that surgery will improve survival in patients with left main stem and three-vessel disease. Other patients demonstrating improved survival were those with poor left ventricular function, unstable angina, old age, history of myocardial infarction and positive exercise test results.

With respect to PTCA, one trial has demonstrated that PTCA offered better relief of angina for people with single-vessel disease than medical treatment but at a higher cost and with a greater chance of complications [120]. A second trial, RITA II, is also comparing PTCA with medical therapy, however no results have yet been published [121].

Table 4.1: Patient characteristics, five-year mortality and subgroups showing the greatest survival gains from CABG included in randomised controlled trials (RCTs) and an observational study.

	RCTs for patients with stable angina: meta-analysis [109]	RCT for patients with unstable angina [115-117]	Observational study [119]
Patient characteristics			
1. Age	< 65	< 70	All ages
2. Sex	96.8% Male	100% Male	81% Male
3. Angina			
No angina	11.2%	-	
Class I or II	53.8%	-	16%
Class III or IV	35.0%	100%	84%
4. Ejection fraction	19.7% EF < 50%	28.0% EF < 50%	NA
5. Previous MI	59.6%	42.2%	56.3%
6. Vessels involved			
Single	10.2%	18.7%	20.7%
2-vessel	32.4%	34.9%	29.0%
3-vessel	50.6%	46.4%	42.0%
Left main stem	6.8%	-	8.3%
7. Smokers	83.5%	46.0%	72.5%
Mortality (5 year)	Medical 15.8% CABG 10.2%	Medical 19.0% CABG 16.0%	Medical 20.0% CABG 12.0%
Subgroups showing greatest survival gains from CABG	(1) Left main stem disease (2) Three-vessel disease (3) Left anterior descending disease (4) High overall risk (defined by poor left ventricular function, history of MI, positive exercise test, old age)	(1) Severe rest angina (2) Three-vessel disease (3) Poor left ventricular function	(1) Left main stem disease (2) Three-vessel disease (3) High overall risk (defined by old age, unstable angina, poor left ventricular function)

NA, not available. MI, myocardial infarction. EF, ejection fraction

The final issue relates to the relative benefits of CABG and PTCA. Several RCTs and non-randomised studies have compared the two interventions [64]. A number of major trials are currently being conducted comparing the relative effectiveness of PTCA and CABG [122]. The protocols of each of these studies vary greatly reflecting differences in practice. Patients with one-vessel disease are excluded from all trials except the UK Randomised Intervention Treatment for Angina (RITA) trial [123], due to the widely held but unproven view that PTCA is the treatment choice for this set of patients. All trials exclude patients with left main stem disease. There is less agreement about the selection of patients with multi-vessel disease.

Only two have published interim results. The RITA trial has reported that, after a two year follow-up of 1011 randomised patients, there were no differences in survival or in the rate of myocardial infarction between the two groups. Recovery after CABG took longer than after PTCA, though CABG led to less risk of angina and fewer additional diagnostic and therapeutic interventions. The follow-up will continue for at least five years [124]. The Argentinian randomised trial (ERACI) reported that after one year 84% of patients undergoing CABG were free of cardiac events compared to only 64% of PTCA patients. Furthermore 32% of PTCA patients required a repeat procedure compared to only 3% of CABG patients [125].

The as yet limited evidence available from the trials regarding the effectiveness of angioplasty can be supplemented by information obtained from several non-randomised studies [126,127]. There is a consensus that for patients with single vessel disease PTCA is preferable and for patients with left main stem disease CABG is preferable.

One review stated that the primary success rate and the rate of restenosis are the principal factors limiting PTCA's effectiveness [126]. An estimated 20-30% of patients undergoing angioplasty develop restenosis [128], a problem that remains largely unsolved.

Angioplasty is a relatively new intervention, therefore the problem of changing technology is greater than for CABG. As a result, evaluations of its effectiveness from experimental and observational data may be out of date by the time they are published and may not apply to newer PTCA techniques such as the use of lasers and intra-coronary stents.

4.5.2 Effects of waiting on effectiveness

In the NHS, universal access to health care is free at the point of use. However since the demand for health care exceeds the available medical resources, a system of rationing becomes unavoidable. The explicit form of rationing in the UK has been queuing on waiting lists. Patients are not denied access to health care, but access is temporarily delayed. No research has demonstrated that delaying surgery adversely affects outcome. It is not known whether waiting is associated with increased preoperative or postoperative mortality or morbidity.

For some groups of patients access to surgery is delayed indefinitely, by not allowing them to use the service at all. In the US, the poor [129], women [130], and ethnic

minorities [131], have less access to cardiac surgery than the rest of the population. Such inequities have also been found in the UK for women [132] and individuals living in areas of high deprivation [133] and explicit denial of patients who smoke has been suggested [134]. Reasons for inequitable use may relate to the attitudes and behaviour of clinicians, patients or both. Again it is not known if denying certain groups of patients access to care affects the overall benefits derived from treatment.

Some studies have found that some patients die while waiting for surgery though the cause of these deaths does not necessarily relate to the delay itself. One study conducted in South West Thames (1979-88) found that 2.4% of patients referred to NHS hospitals died while waiting for surgery, while no deaths occurred among those referred to private hospitals [135]. A European study, conducted in The Netherlands, found a similar death rate (2.2%) in its study population [136]. In the Canadian province of Ontario only 1% of patients died while waiting [137]. The relationship between waiting and morbidity is also poorly researched. Long waiting times have been found to be associated with an increase in the psychosocial burden of disease on patients [138,139], greater costs to patients [139] and a reduction in the ability to return to work [140,141]. It has been suggested that delaying surgery in some patients may lead to a destabilisation of symptoms and thereby increasing the risk of operative mortality [137].

The case-control study conducted in the Netherlands identified a set of risk factors which were associated with mortality while waiting [136]. Patients at high risk of short-term mortality were found to be those with evidence of cardiac enlargement on

chest X-ray, a positive exercise test, coumarin treatment, unstable angina, left main stem disease and three-vessel disease. Poor left-ventricular function was found to be associated with an increased risk of mortality but was not an independent variable. Another study, conducted in Ontario, found that patients with left main stem disease were three times more likely to die while waiting than other patients [137].

4.5.3 Costs and Cost-Effectiveness

Economic studies comparing CABG and PTCA with medical therapy are very poor and most only relate to cost differences. Comparison of costs of CABG with medical therapy have shown that one year costs for medical therapy were only a third of CABG costs [142]. However, CABG patients had higher event-free survival and quality of life, suggesting less difference as regards cost-effectiveness [143]. Comparison of the costs of PTCA and medical therapy found that PTCA was three times more expensive than medical therapy initially, rising to five times more expensive after one year due to the high follow-up costs [144].

The comparative cost-effectiveness of PTCA and CABG is influenced by several factors: PTCA is initially cheaper to perform, has a shorter length of hospital stay and patients are able to return to work more quickly than CABG patients. PTCA, however, has higher reintervention rates. Analyses must therefore assess the frequency and the cost of the reintervention rate for those interventions that fail or where restenosis of the arteries occurs requiring a repeat procedure. One study which

assessed the comparative costs of PTCA and CABG found that PTCA was cheaper than CABG, but suffered from higher reintervention rates (29% compared to 2%) which reduced the apparent cost difference [144].

Few of the studies comparing costs of CABG and PTCA have been based on RCTs [144-152]. There are two exceptions. The Argentinian randomised trial found that the initial cost of PTCA was 33% that of CABG but increased to 54% at one year [125]. The RITA trial has recently reported the health service costs of the two procedures at two years. The initial cost of PTCA (£3467) was only 52% that of CABG (£6628) but after two years this increased to 80% (£6208 and £7685). The reduction in the cost difference was due to the higher rate of reintervention, diagnostic tests and drug use in PTCA patients [67]. A factor which will decrease the cost advantage of PTCA even further is that PTCA may precipitate infarction or other complications which then require immediate bypass surgery. Estimates of the proportion of patients undergoing PTCA who require emergency surgery vary from 4% to 21% [153].

There have been few attempts to compare the cost-effectiveness of coronary revascularisations with other treatments in terms of cost per life year gained or per quality adjusted life year gained (QALY). Assessing the relative cost-effectiveness of these procedures against other interventions is essential if purchasers are to allocate resources between competing needs in the most cost-effective way. Studies which have attempted to construct league tables using cost per QALY data have shown that for patients undergoing CABG, the cost-effectiveness varies with the severity of the

disease. In patients with severe angina and left main disease, CABG cost £2,090 per QALY gained in 1990, whereas for a patient with moderate angina and single vessel disease the cost per QALY gained was £18,830 (Table 4.2). It should be noted that the use of the QALY is open to substantial criticism because of the underlying assumptions. They are, however, a useful guide to the relative magnitudes involved when making decisions based on the cost-effectiveness of different interventions.

Table 4.2: Cost/QALY of competing treatments

Treatment	Cost/QALY (£ Aug 1990)
Cholesterol testing and diet therapy only (all adults aged 40-69)	220
Advise from GP to stop smoking	270
Neurosurgical intervention for subarachnoid haemorrhage	490
Anti-hypertensive treatment to prevent stroke (ages 45-64)	940
Pacemaker implantation	1,100
Hip replacement	1,180
Valve replacement for aortic stenosis	1,190
Cholesterol testing and treatment	1,480
CABG (left main stem disease, severe angina)	2,090
Kidney transplant	4,710
Breast cancer screening	5,780
Heart transplantation	7,840
Cholesterol testing and treatment of all adults aged 25-39	14,150
CABG (single vessel disease, moderate angina)	18,830
Continuous ambulatory peritoneal dialysis	19,870
Erthropoietin treatment for anaemia in dialysis patients	54,380
Neurosurgical intervention for malignant intracranial tumours	107,780

Source: Gunnell 1994 [64]

4.6 Recent developments in improving effectiveness

The introduction to the NHS of contracting has emphasised the need for health care providers to demonstrate the effectiveness and cost-effectiveness of their services. For purchasers evaluation of services is high on the agenda as demographic change, new costly medical technologies and growing public expectations place increasing pressure on their budgets. The need to ensure that a high quality, cost-effective package of care has been secured for their resident population has never before been so apparent. This has brought about an increase in the use of clinical audit and the subsequent development of clinical guidelines to ensure that care is both appropriate and effective.

4.6.1 Clinical Audit

The recent focus of coronary revascularisation services has been on monitoring outcomes. This involves the comparison of operative results, generally in terms of mortality, against accepted standards of care. Mortality has been the most commonly used measure of outcome because it is an important performance indicator in heart surgery, is easy to measure and is more often available than other measures of outcome. There is a consensus among health care professionals that if mortality is to be used both to assess the quality of patient care within hospitals and to make meaningful comparisons between hospitals, the measure must be accurately risk adjusted [154].

Risk adjustment aims to account for the effect specific patient-related risk factors have on outcomes by stratifying patients into risk groups before comparisons of outcomes are made. Risk-adjusted actual (or observed) mortality can then be compared with predicted rates to identify poor or good quality care. The literature on risk-adjustment strategies has expanded dramatically over the last few years, especially in the field of acute hospital care [155].

Several risk-adjustment models have been developed for CABG. The models aim to predict mortality using data on the clinical experience of a defined group of patients. The predictive accuracy of these models and ease of use vary widely. Randomised controlled trials have formed the basis of some risk stratification methods [156], some using Baysian analysis to sort patients into risk categories [157]. However, these models are limited by patient selection criteria and the clinical variables collected during the trial.

Other models have been of limited value because they were based on information from patients undergoing surgery at only one hospital. These include: the Montreal Heart Institute scoring system [158], which has been criticised for being based on only 500 patients; the Parsonnet Risk Stratification System [159], which has been criticised both for its reliance on individual physician's opinions to assign weights to certain factors [160] and for its statistical foundations which have been considered to be inappropriate [161]; and the Higgins Clinical Severity Score, which also attempted to build morbidity into its model, but when tested failed to predict morbidity accurately in high risk patients [160].

Comparisons of the Parsonnet model with the Baysian analysis suggest the latter may be a more accurate method of predicting operative mortality [157,162,163]. Baysian analysis has two main advantages over the Parsonnet model; first, it is able to account for a large number of risk factors and second, it is flexible enough to allow for modifications to take account of changes in the patient population and/or clinical practice which affect operative risk.

Few risk-adjustment strategies have been developed for PTCA. Only one model has been developed to date. It was set up to predict long-term (5 year) morbidity and mortality [164]. However, the model was not based on the results of randomised controlled trials and the patient data used were collected at only one hospital. Its application is therefore limited.

4.6.2 Clinical guidelines

Guidelines have been defined as 'systematically developed statements to assist practitioners and patient decisions about appropriate health care for specific clinical circumstances' [165]. Purchasers' interest in the development of clinical guidelines stems from the belief that they will ensure that limited resources are used in the most efficient and appropriate manner thereby maximising the potential benefits derived from health care services [166]. It has been argued, however, that guidelines would only be effective if appropriately developed, disseminated and implemented [167]. Guides for purchasers to ensure guidelines are scientifically valid and implemented

successfully have been produced [168,169].

In the field of coronary revascularisation services a number of guidelines have been developed with the aim of ensuring that treatment is given on the basis of ability to benefit (appropriate utilisation) and that the timing of surgery is based on urgency of need (appropriate prioritisation). Various guidelines on the appropriate use of CABG and PTCA have been produced by the British Cardiac Society and by the American College of Cardiology and the American Heart Association [170-172]. There are however, few published audits of performance measured against these guidelines.

Waiting lists for in-patient surgical procedures have always been a feature of the NHS. As previously stated, the number of deaths which occur on the waiting list is low and the number of patients whose symptoms deteriorate is unknown. However, if it is assumed that the delay itself causes the death of patients on the waiting list and that those patients whose symptoms deteriorate while waiting are at increased risk of operative and postoperative death, then there is a case for developing guidelines to ensure that the number of such deaths are minimised. Guidelines for assessing urgency have been developed in Canada, using a consensus panel [173], and used to audit the appropriateness of prioritisation of CABG and PTCA in both Canada [137,174] and New Zealand [175]. Similar guidelines are being developed in New Zealand [176]. In the UK the British Cardiac Society is developing guidelines for the identification of patients who should bypass the waiting list and be referred for treatment as an urgent case [177]. However, guidelines to assess the urgency of patients waiting for surgery in the UK have not yet been developed.

4.7 Summary

CHD is a major cause of mortality and morbidity in the UK. Treatments for the disease are costly and demand is continuing to rise despite the fall in the death rate from CHD.

Utilisation rates for CABG and PTCA have increased dramatically since they were first introduced and wide international and national variations have been found. A number of factors have contributed to the increase in demand which include the increased use of new technology, both investigation techniques and PTCA. Reasons for the wide variations in the use of coronary revascularisation procedures include statistical, supply and demand factors. No rigorous studies have been conducted in the UK on why district and regional rates of CABG and PTCA vary.

There is a lack of data on the need for revascularisation which makes it difficult to estimate the right rate of use. The national target set in 1984 was based on the level of use in other counties and is therefore only a crude estimate of relative need.

Randomised controlled trials have shown that CABG is effective in increasing survival and the relief of angina in patients who have not responded to medical therapy and whose angiograms show multi-vessel disease or disease of the left main artery. PTCA is cheaper and less invasive but with higher reintervention rates which reduce the apparent cost difference. PTCA produces optimal results when confined to individuals who have not responded to medical management and whose angiograms show single-

vessel disease. As techniques and patient characteristics change, caution must be taken in generalising these results to the present day. The effect waiting has on the overall effectiveness of CABG and PTCA is unknown.

Revascularisation should be restricted to those patients most likely to benefit. The development of clinical guidelines and the increased use of clinical audit are two initiatives which may help to ensure that those patients who can benefit the most from revascularisation services are given priority and that treatment is received within an appropriate time period. Purchasers, when determining where resources should be spent, must assess the relative benefits of revascularisation services compared to other health services in order to maximise the health benefits from the resources available.

PART II

CHAPTER 5

TRENDS IN THE AVAILABILITY AND USE OF CORONARY REVASCULARISATION SERVICES

5.1 Introduction

Market forces were introduced into the NHS four years ago. Measuring the impact of the reforms on social welfare is complicated by the effects of other concurrent policy changes including: the Governments' White Paper 'The Health of the Nation'[11]; the incorporation of a maximum in-patient waiting time of twelve months for CABG in the Patient's Charter [14]; the introduction of a new weighted capitation formula for distributing funds to health regions [1,178]; and the Tomlinson inquiry and similar undertakings in other major cities set up to recommend major changes in the configurations of health services [12].

Despite the methodological difficulties associated with measuring the impact of the reforms it is important that attempts to understand what impact the 1991 reforms have had and are having on specialist services are undertaken. The selected criteria against which the reforms are to be judged are those of productive and allocative efficiency. Equity will be used to describe the distributional aspects of the reforms. Quantitative and qualitative methods were used to assess whether the change in resource allocations brought about by the reforms have been instrumental in improving efficiency. The quantitative analysis is presented in this chapter and the qualitative analysis in Chapter 6. This chapter reviews and discusses the patterns and trends in resource availability, resource use and cost of coronary revascularisation services. Chapter 6 assesses how the contracting process has influenced any of the observed changes in the service.

5.2 Methods

The study (quantitative and qualitative) was carried out in three English Regions (South East Thames, East Anglian, North Western) and three Scottish Health Boards (Greater Glasgow, Lanarkshire, Ayr/Arran). For the purposes of this study, the area covered by the three Scottish Health Boards will be referred to as a Region. This provided a sample of 42 English Health Districts and three Scottish Health Boards and covered a total population in 1991 of 11.6 million (20% of the UK population). They were selected to provide a representative sample with reference to historical levels of provision, population density, geographical location and initial approaches to purchasing.

Data for five financial years were collected, two of which were periods before the 1991 NHS reforms were implemented (1987/88, 1989/90, 1991/92, 1992/93, 1993/94). All patients who underwent either CABG (OPCS codes K40-K46) or PTCA (OPCS codes K49-K50) without any other procedure were included in the study.

All NHS and private hospitals providing revascularisation services for the residents of the four Regions were identified (Table 5.1). The location of these providers in each Region are shown in Appendix I.

Table 5.1: NHS and private providers included in the study in South East Thames, East Anglian, North Western and Greater Glasgow.

	Intraregional NHS providers	**Extraregional NHS providers**	**Private providers**
South East Thames	Guy's Hospital Brook Hospital St Thomas' Hospital King's College Hospital	Royal Brompton Hospital St Mary's Hospital St Bartholomew's Hospital St George's Hospital	Data not supplied by several providers
East Anglian	Papworth Hospital	Royal Brompton Hospital	Cambridge Lea Hospital
North Western	Wythenshawe Hospital Manchester Royal Infirmary Blackpool Victoria Hospital	Liverpool Cardiothoracic Centre Leeds General Infirmary	Alexandra Hospital
Greater Glasgow	Glasgow Western Infirmary Glasgow Royal Infirmary	None	Ross Hall Hospital

Intraregional providers were identified by contacting the relevant RHAs. Patient flows out of the Regions, to so-called extraregional providers, were identified by obtaining aggregated data from all providers who might have treated patients from the study Regions in 1991/92. Data on individual patients were then collected from all the major providers such that at least 97% of all procedures carried out on the study population were included. This meant data were collected from 10 intraregional NHS providers, 6 extraregional NHS providers and 3 intraregional private providers. Private hospitals outside the study Regions made little contribution in East Anglian, North Western and Greater Glasgow. In South East Thames, four private providers refused or were unable to supply data, therefore analyses for that Region had to be restricted to NHS patients.

5.2.1 Data relating to the availability of revascularisation resources

The following data were collected from each of the intraregional NHS providers for the first four periods of the study (1987/88 - 1992/93): number of whole-time-equivalent (WTE) consultant and non-consultant[7] staff by grade in cardiac surgery and cardiology; and the number of available beds in cardiac surgery and cardiology. Staff and beds devoted to thoracic surgery were excluded. Cardiologists were only included if their main base was at the provider unit carrying out CABG or PTCA. This will underestimate the number of cardiologists in those areas where cardiologists and general physicians with a special interest in cardiology are based outside the Regional

[7] Non-consultant staff included senior registrar, associate specialist, registrar, senior house officer and lecturer.

provider unit.

Availability of revascularisation resources within each Region was determined by relating intraregional staffing and bed levels to the resident population. This definition of availability was based on the assumption that it is NHS policy to achieve a regionally equitable distribution of resources. The resident population used was men and women aged over 24 years as few people below this age are treated at adult centres. For Greater Glasgow Region, it was assumed that the NHS providers in Glasgow served an area which covered 4 health boards[8] in addition to the three health boards included in this study.

5.2.2 Data relating to utilisation of revascularisation services

The following data on all patients treated by each of the 19 providers were collected for all five time periods of the study: age, sex, procedure, provider unit, and District/Board of residence. Data were collected from a variety of sources including clinical computer systems, manual registers, card indexes, clinician's summary charts, theatre registers and case notes. For the first three time periods data on District/Board of residence was often not available. For these patients a postcode had to be obtained from the hospital's computer system. The District was then identified using a commercial software package. Data were entered into a dBase file, analysed using EPI-INFO and then transferred into a Lotus 1-2-3 spreadsheet. Patients whose age

[8] These areas comprised the Western Isles, Argyll/Clyde, Dumfires/Galloway, and half of Forth Valley Health Board.

was unknown (about 2%) were distributed across the age range according to the age distribution of the majority of patients whose ages were known. District utilisation rates, directly standardised[9] for sex and age (25-44,45-54,55-64,65-74,75 years or older) and Regional rates (per million aged over 24 years and per million total population) were calculated for each procedure for each year of the study for NHS provision and private provision separately.

Comparison of the extent of inter-district variation within each Region were made using the systematic component of variation (SCV) [179]. This takes into account differences in the mean Regional rate and differences in the sizes of the District populations, both of which will influence the amount of random variation. This provides a measure of the extent of variation which can be used to compare Regions or different years. Values below about 4 indicate low variation, 5-10 moderate variation and above 10, high variation. Trends in the use of services were considered in three categories: treated as NHS patients within or outside their Region (total NHS provision); treated as NHS patients outside their Region (NHS-extraregional provision); treated privately either inside or outside their Region (Private provision). Trends in the sociodemographic characteristics of patients was assessed and reasons for the variations in rates were sought for the latest study period (1993/94)[10].

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[9] Rates were directly standardised using the total population of the four regions derived from the 1991 decennial census.

[10] Except for the geographical mapping of Districts' rates which was done for the preceding year (1992/93).

5.2.3 Data relating to the costs of services

Data relating to the cost of CABG and PTCA were obtained from interviews with intraregional providers and purchasers carried out in July and August 1994. The interview structure will be discussed in more detail in Chapter 6. Each provider was asked what their Extra-contractual referral (ECR) price was for each of the procedures and was asked to give an assessment of how it had changed over time. A list of ECR prices was also requested from purchasers.

5.3 Results : availability of services

5.3.1 Cardiac surgical services

The availability of consultant staff changed very little between 1987/88 and 1992/93 (Table 5.2). In most Regions it showed only a slight rise (East Anglian, South East Thames, Greater Glasgow) and remained the same in one (North Western). There was however a notable increase in the availability of non-consultant staff. In Greater Glasgow, for example, the number per million population increased from 5.68 in 1987 to 10.00 in 1993, representing an increase of 76%. The availability of cardiac surgical beds fell in South East Thames by 13%, but more dramatically in North Western Region by 31%. In the other two Regions there was an increase (East Anglian 26%, Greater Glasgow 12%).

Table 5.2: Medical staff and beds per million population for cardiac surgery and cardiology in the four study Regions (1987-1993).

Regions	Cardiac Surgery			Cardiology		
	Consultants	Non-consultants	Beds	Consultants	Non-consultants	Beds
South East Thames						
1987/88	2.94	7.52	32.20	3.81	8.35	33.80
1989/90	3.01	7.40	30.80	3.77	8.22	29.60
1991/92	3.14	8.89	28.30	4.06	8.69	30.30
1992/93	3.89	9.30	27.90	4.70	8.29	34.00
East Anglian						
1987/88	1.75	4.57	23.60	2.20	3.81	22.80
1989/90	2.26	4.38	24.10	2.99	3.65	21.90
1991/92	2.16	5.03	27.30	2.73	4.31	21.60
1992/93	2.12	5.67	29.70	2.83	4.25	21.20
North Western						
1987/88	4.61	7.36	56.50	3.48	5.03	32.10
1989/90	4.54	7.63	55.10	3.44	5.34	31.70
1991/92	4.86	7.90	54.60	3.38	5.65	28.20
1992/93	4.48	8.28	39.10	3.76	6.02	28.20
Greater Glasgow						
1987/88	2.78	5.68	26.00	4.56	7.69	22.50
1989/90	2.75	6.22	25.80	4.46	7.63	22.30
1991/92	3.09	7.81	25.70	4.43	8.16	21.00
1992/93	3.66	10.00	29.10	4.30	8.14	20.90

Wide inter-regional differences in surgical staffing levels were found. In 1987/88 there was a 2.6 fold difference in the level of consultants between East Anglian and North Western, which had reduced to a 2.1 fold difference by 1992/93. East Anglian also had the lowest provision of non-consultant surgical staff. Bed provision was fairly similar for three Regions (South East Thames, East Anglian, Greater Glasgow). In 1987/88 bed provision per million population ranged from 24 to 32 and from 28 to 29 in 1992/93. The exception was North Western, which traditionally had twice the number, but this fell in 1992/93 to 39 per million.

5.3.2 Cardiology services

There was also very little change in the provision of cardiology staff and beds between 1987/88 and 1992/93 (Table 5.2). The availability of consultant cardiologists increased only slightly in three Regions and fell in one (Greater Glasgow). The number of non-consultant staff per million population increased by 6-20% in all Regions except South East Thames. Bed provision hardly changed at all.

Inter-regional differences, however, were as pronounced as for cardiac surgical provision. Greater Glasgow and South East Thames had about 60% more consultants and twice as many non-consultants per million population than East Anglian. Bed provision in South East Thames and North Western was about 50% higher than in the other two Regions.

5.4 Results: utilisation

5.4.1 Trends in utilisation

The overall NHS rates (per million total population) for both procedures increased every year in all Regions between 1987/88 and 1993/94 except in Greater Glasgow, where the rate started to decrease in 1993/94 (Figures 5.1 and 5.2). The rates for intraregional NHS provision are shown in Appendix II, for intra plus extraregional NHS provision in Appendix III, for private provision in Appendix IV and for NHS and private provision combined in Appendix V. The annual growth in the Regional rate for CABG was maintained over the six years in E Anglian (Table 5.3). In N Western and SE Thames the rate of increase in the Regional rate increased in 1993/94 after having slowed down between 1987/88 and 1992/93. No trend was apparent in G Glasgow where the annual rates of increase fluctuated.

Table 5.3: Annual changes (%) in NHS rates (per million total population) of CABG in the four study Regions (1987/88 to 1993/94)

	REGION			
	E Anglian	N Western	SE Thames	G Glasgow
87/88 - 89/90	12.3	14.5	14.8	2.3
89/90 - 91/92	14.6	8.5	7.3	23.3
91/92 - 92/93	16.7	1.0	7.4	6.8
92/93 - 93/94	18.9	5.7	16.9	-4.0

Figure 5.1: Age-sex standardised rates (per million total population) of CABG in the four study regions (1987/88 - 1993/94). [* Private provision for SE Thames not included]

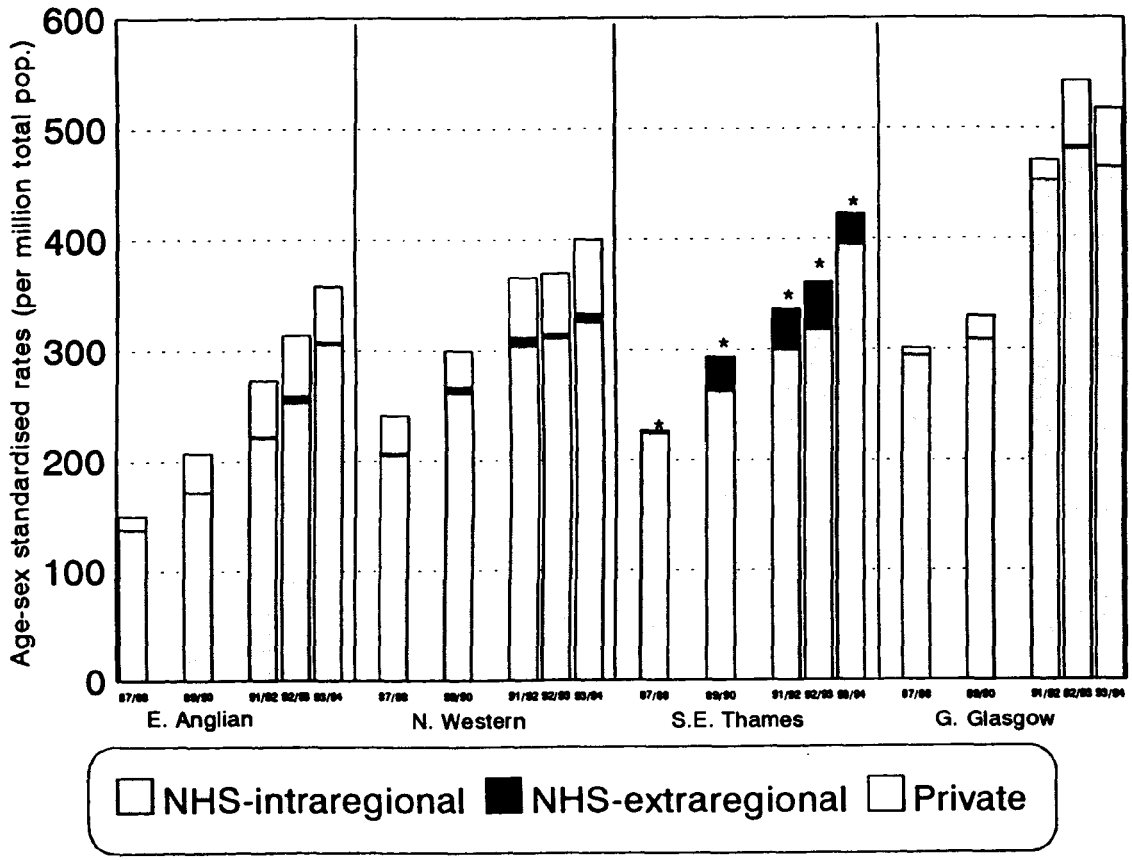
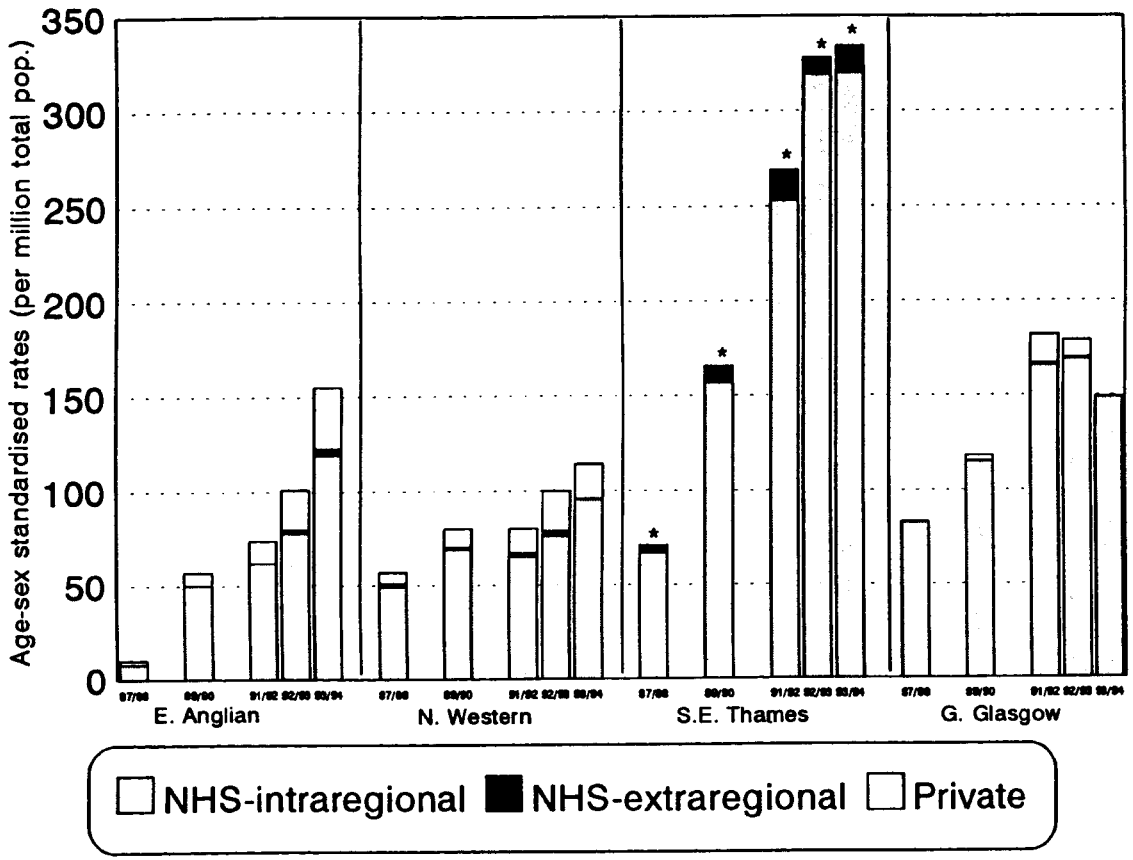


Figure 5.2: Age-sex standardised rates (per million total population) of PTCA in the four study regions (1987/88 - 1993/94). [* Private provision for SE Thames not included]



All four Regions achieved the nationally agreed target for the NHS of 300 CABGs per million total population. Greater Glasgow had achieved the target by 1989/90, SE Thames by 1990/91, North Western by 1991/92 and East Anglian by 1993/94. In the last year of the study, two of the Regions had NHS rates well above the target set (G Glasgow 465 per million and SET 423 per million) while two had rates lying just above it (E Anglian 308 per million and N Western 333 per million).

Most NHS cases were treated within a resident's local Region. The extent of extraregional NHS provision varied. In the final year of the study (1993/94), the proportion of CABG cases provided outside the local Region varied from none in Greater Glasgow to 7% in South East Thames and for PTCA from none in Greater Glasgow to 4% in South East Thames. No trend in the proportion of cases treated outside a Region was found over time.

The contribution of the private sector also varied between Regions. In 1993/94 private financing increased the rate of CABG by 10% in Greater Glasgow, 14% in East Anglian and 17% in North Western. The equivalent proportions for PTCA were 1%, 21% and 15%. The proportions for South East Thames are not known but it is likely that they would be higher[11]. The proportion of cases that were private increased from 1987/88 when the proportions were 2% (Greater Glasgow), 8% (East Anglian) and 14% (North Western) for CABG. The equivalent proportions for PTCA were 0%,

[11] Data were collected from all but four potential private providers in South East Thames at the beginning of the study for 1991/92 and the proportion of CABGs paid for privately was 17%. The actual proportion is likely to have been considerably higher.

10%, 11%.

Concurrent with the continued increase in revascularisation rates was an increase in the mean age of patients and an increase in the number of females relative to the number of males. The mean age of patients increased over the seven year period by 3.5 years from 56.3 to 59.8 (Table 5.4). The mean age of women was about three years older than of men (1993/94; 62.2 v 59.1) and the mean age for bypass grafting was about two years older than for angioplasty (1993/94; 60.4 v 58.5). These differences were fairly constant over the seven years studied. Revascularisation rates in men were about three and a half times higher than in women in 1993/94 (3.46:1), however, this was significantly less than in 1987/88 (4.20:1). The higher male utilisation rates can be partly explained by their disproportionate use of the private sector. Although the mean age of NHS and private patients was similar, a high proportion of private patients were men (Table 5.5).

Table 5.4: Mean (standard deviation) age (years) of patients undergoing revascularisation in the four study Regions (private patients in South East Thames excluded).

	Men	Women	Overall
CABG			
1987/88	56.1 (8.6)	59.3 (8.7)	56.7 (8.8)
1989/90	57.2 (8.9)	60.1 (9.4)	57.8 (9.1)
1991/92	58.3 (9.1)	61.7 (8.8)	58.9 (9.1)
1992/93	58.8 (9.3)	62.1 (8.7)	59.5 (9.3)
1993/94	59.7 (9.0)	62.9 (8.4)	60.4 (9.0)
PTCA			
1987/88	54.4 (9.0)	57.3 (9.8)	55.2 (9.2)
1989/90	55.2 (9.2)	57.5 (10.1)	57.7 (9.5)
1991/92	56.5 (10.0)	59.6 (9.8)	57.3 (10.1)
1992/93	57.2 (9.7)	59.7 (10.2)	57.9 (9.9)
1993/94	57.6 (9.7)	61.0 (9.8)	58.5 (9.9)
Overall			
1987/88	55.8 (8.7)	58.7 (9.1)	56.3 (8.9)
1989/90	56.7 (9.1)	59.2 (9.7)	57.2 (9.2)
1991/92	57.7 (9.4)	60.9 (9.3)	58.4 (9.5)
1992/93	58.3 (9.5)	61.2 (9.4)	58.9 (9.5)
1993/94	59.1 (9.3)	62.2 (9.0)	59.8 (9.3)

Table 5.5: Comparison of mean age and sex ratio (male to female) of NHS and private patients (East Anglian, North Western and Greater Glasgow Regions)

	Mean age (years)		Sex Ratio	
	NHS	Private	NHS	Private
1987/88	56.3	55.2	3.8	7.7
1989/90	56.9	56.9	4.2	6.2
1991/92	57.8	57.7	3.9	7.2
1992/93	58.6	57.9	3.6	5.5
1993/94	59.5	59.0	3.4	5.0

Comparison of the utilisation rates for each year revealed significant inter-regional differences in NHS rates (per million aged over 24 years) for the two procedures which were persistent (Table 5.6). For CABG, in 1993/94, the rates varied 1.5 fold from 459 per million (East Anglian) to 704 per million (Greater Glasgow) and for PTCA, 3.4 fold, from 146 per million (North Western) to 499 per million (South East Thames). The variation in utilisation rates between Districts within each Region was, not surprisingly, even greater than the extent of inter-regional variation (Table 5.6). In 1993/94 the District rate of CABG varied 4-fold from 257 to 1029 per million population aged over 24 years and the rate of PTCA varied 34-fold from 43-1475 per million. The amount of variation fluctuated over the six years studied. It reached its highest level for CABG in 1991/92 (9-fold) and in 1992/93 for PTCA (120-fold). Some of these differences between Districts arose from random variation. To take account of differences in the mean Regional rates and differences in the sizes of District populations, both of which will influence the amount of random variation, the SCV was calculated (Table 5.7).

Table 5.7: Systematic component of variation (SCV) between District rates (NHS crude rates) of CABG and PTCA in the four study Regions (1987/88 - 1993/94)

	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
E Anglian	3.8	4.7	5.5	4.6	3.0	+	55.0	14.3	14.8	23.6
N Western	27.3	18.8	13.1	12.1	8.6	39.8	56.8	24.5	60.0	10.4
SE Thames	15.7	11.1	9.6	5.7	6.7	50.1	47.6	36.9	50.4	44.1
G Glasgow	1.7	1.8	5.5	6.6	1.9	19.9	11.1	4.3	2.9	0.7

\+ insufficient number of observations to give a reliable statistic

Table 5.6: Differences in Regional and District NHS rates (per million population aged > 24 years) for CABG and PTCA (1987/88-1993/94).

Year	CABG				PTCA			
	Region		District		Region		District	
	Range	(Ratio*)	Range	(Ratio*)	Range	(Ratio*)	Range	(Ratio*)
1987/88	213-461	(2.2)	124-951	(7.7)	13-130	(10.0)	8-346	(43.3)
1989/90	261-475	(1.8)	159-1091	(6.9)	76-248	(3.3)	22-694	(31.5)
1991/92	332-687	(2.1)	105-949	(9.0)	92-401	(4.4)	18-1117	(62.1)
1992/93	387-734	(1.9)	212-1077	(5.1)	119-490	(4.1)	12-1450	(120.1)
1993/94	459-704	(1.5)	257-1029	(4.0)	146-499	(3.4)	43-1475	(34.3)

* Ratio of highest to lowest rate.

Between 1987/88 and 1993/94 the extent of inter-district variation in CABG rates was low or moderate but fluctuating in East Anglian and Greater Glasgow and high but decreasing in North Western and South East Thames. For PTCA the amount of variation was much higher. In East Anglian and South East Thames the extent of inter-district variation remained very high. In North Western the variation was high but decreased over time and in Greater Glasgow variation decreased to a very low level.

5.4.2 Reasons for variations in use

There are three types of factors which may explain why rates of use of a procedure vary: statistical factors; demand factors; and supply factors.

(a) Statistical factors

Statistical factors were not found to be the cause of variations in utilisation. Observed variation could have been caused by incomplete data collection or the amount of random variation. Incomplete data collection was not a factor which could be put forward to explain the variation as data were collected directly from clinical departments rather than depending on suspect hospital information systems. Also, cross-boundary flows were identified and included in the study so that information was

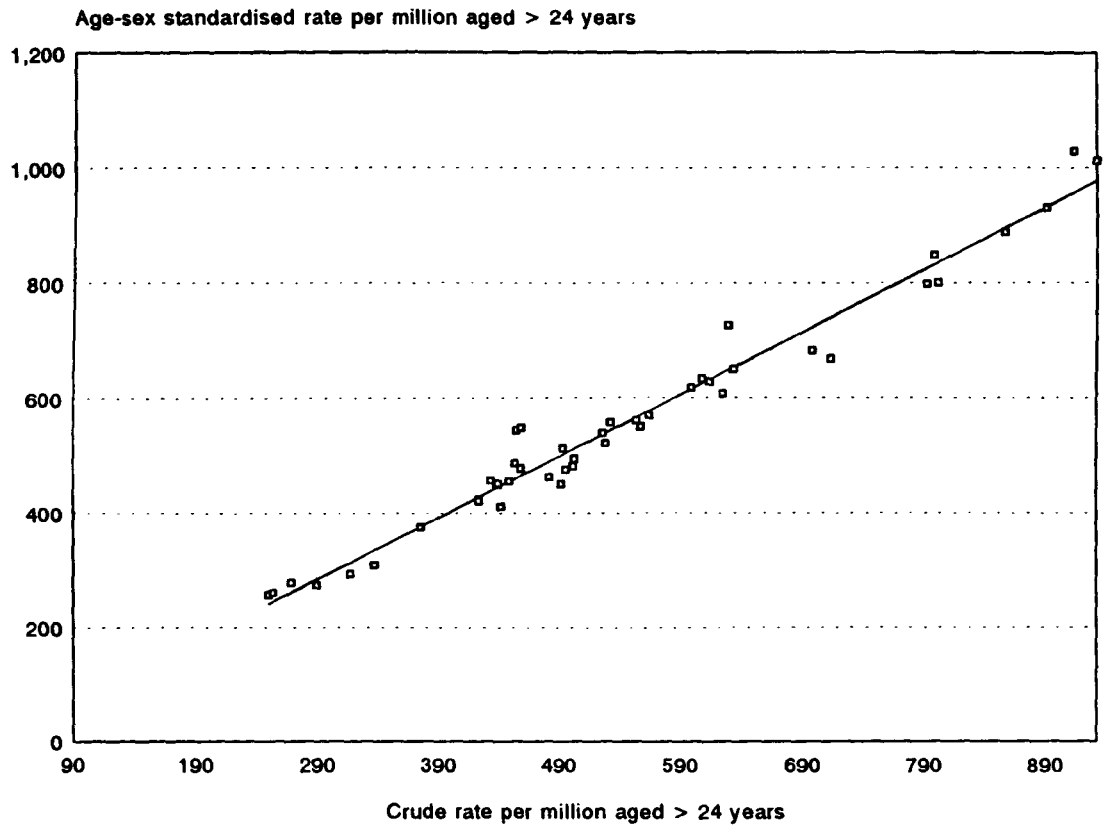
collected on at least 97% of patients resident in the study Districts. High levels of variation persisted even after random variation had been taken into account (Table 5.7).

(b) Demand factors

Demand factors also did not account for much of the observed variations. The factors which influence the demand for a procedure are: the normative need for treatment, people's expectations and the use of alternative interventions. The normative need is determined partly by the age-sex structure of the population and the prevalence of coronary heart disease. The demographic structure of the population was accounted for by standardising the rates for age and sex and found to have no impact on the degree of variation. For both CABG (Figure 5.3) and PTCA (not shown) the crude rates and age-sex standardised rates were closely correlated.

No accurate data existed on the prevalence of coronary heart disease by health district/board, therefore two proxy measures were used: the standardised mortality ratio (SMR) for coronary heart disease (ICD9 410-414; 1990/91) and both the Jarman [180] underprivileged area score and Department of Environment [181] social deprivation index for 1990/91. The amount of association between these proxy measures of need and utilisation rates was assessed using Pearson correlation coefficients. Age-sex standardised utilisation rates were inversely correlated with SMRs but positively

Figure 5.3: Scatterplot of age-sex standardised District rates with crude rates for CABG (1993/94)



correlated with social deprivation (Table 5.8). The correlation coefficients between revascularisation rates and SMRs were significant at the 5% level, but this was not true for the correlations with social deprivation scores. Thus districts with higher intervention rates were associated with lower SMRs and, non-significantly, a higher degree of deprivation. These findings appear to conflict with each other. One explanation is that the association made with the measure of social deprivation may have been confounded by distance from the specialist centre. The more deprived Districts tend to be in inner city areas where many of the specialist centres are located [133].

Table 5.8: Relationship between District NHS revascularisation rates (1993/94) and proxy measures of morbidity (1990/91) (correlation coefficients plus 95% confidence intervals)

	CABG	PTCA	BOTH
Standardised mortality ratio	-0.33 (-0.58 to -0.03)	-0.48 (-0.69 to -0.20)	-0.45 (-0.66 to -0.17)
Jarman underprivileged area score*	0.18 (-0.13 to 0.46)	0.05 (-0.26 to 0.35)	0.11 (-0.20 to 0.40)
Department of Environment social deprivation index*	0.21 (-0.10 to 0.48)	0.08 (-0.23 to 0.37)	0.14 (-0.18 to 0.42)

* higher index scores represent greater deprivation

Variation in utilisation rates could be a product of the demand for other procedures. For example, the rate of use of CABG could be affected by the rate of use of PTCA. The District NHS rates for CABG (1993/94) were however highly correlated with those for PTCA (Pearson correlation coefficient r=0.76, 95% confidence limits 0.60

to 0.86). In other words, districts with a low CABG rate were not compensated for by a high PTCA rate.

(c) Supply factors

The availability of a service was found to be a factor affecting the rate of use and therefore could be used as an explanation for the variations observed. Association between the availability of NHS facilities in a Region and the Regional rate was assessed by means of a scatterplot. Regional rates for CABG and PTCA correlated with consultant and non-consultant staffing levels (one example shown in Figure 5.4) but not with bed numbers. Generally, the higher the staffing levels, the higher the Regional rate of intervention.

Two supply factors at a District level were also analysed. First, the influence of the distance of the District from the main specialist centre was investigated by mapping. Generally, the closer people live to a provider unit, the higher their rate of use of the service (two examples are shown in Figures 5.5 and 5.6).

Figure 5.4 Age-sex standardised rate (NHS and private cases per million population aged 25 years or more) for CABG for three study regions (EA, NW, GG) for years 1987/88(1), 1989/90(2), 1991/92(3), 1992/93(4) by consultant staffing levels in regional centres.

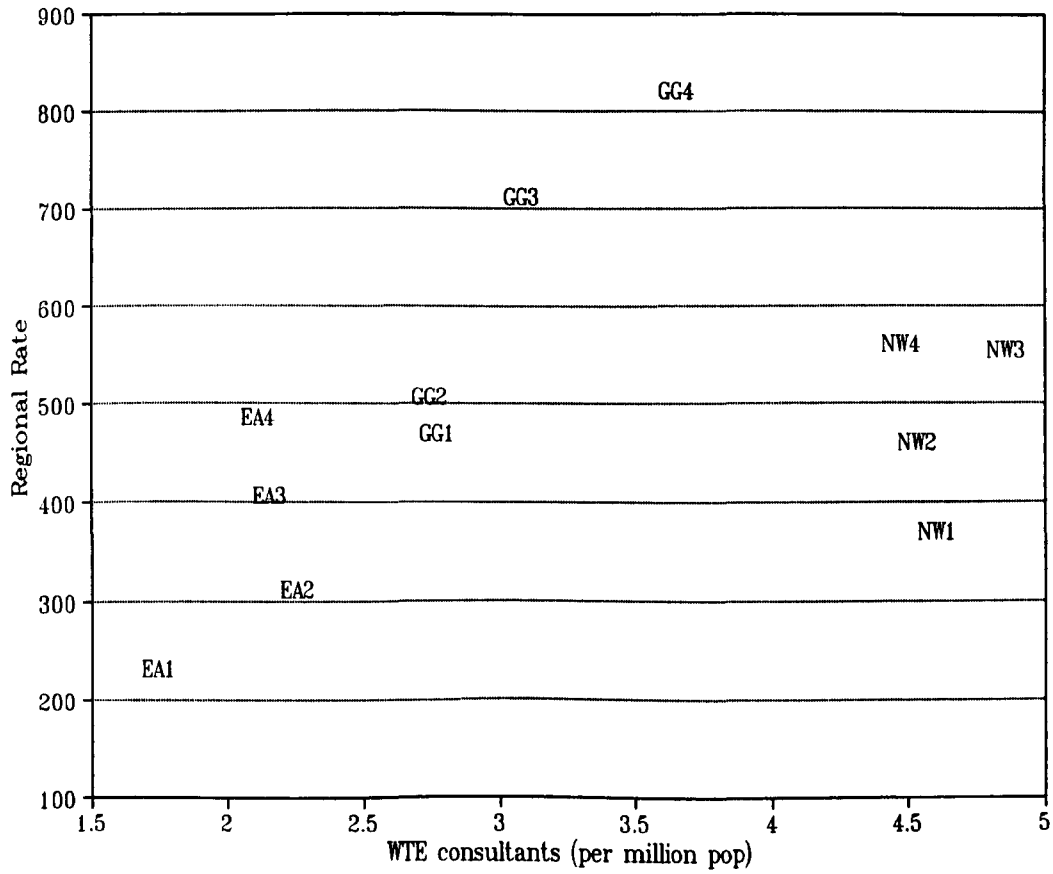


Figure 5.5: Age-sex standardised rates (per million aged over 24 years) of CABG in East Anglian region: NHS and Private cases (1992/93)

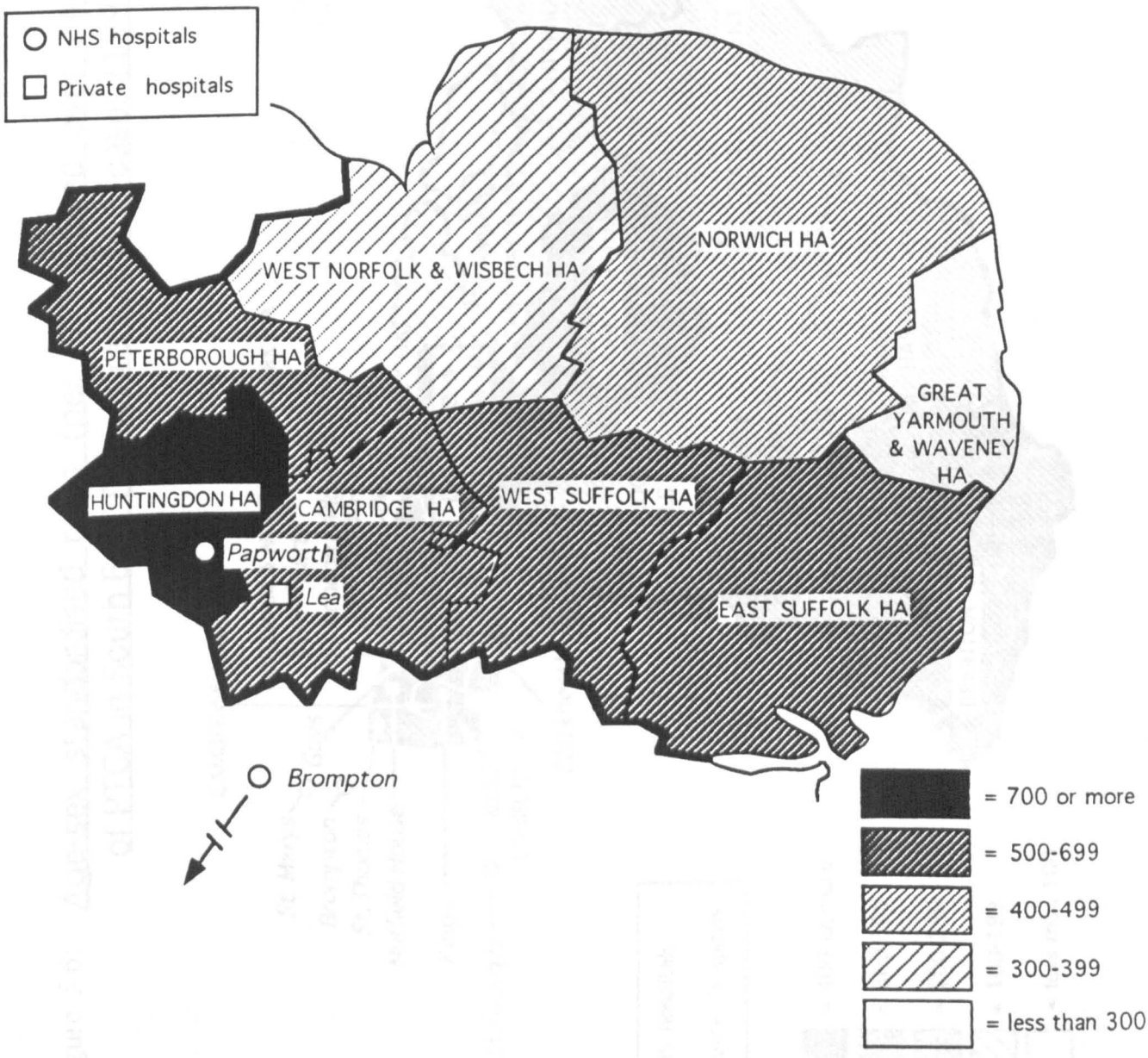
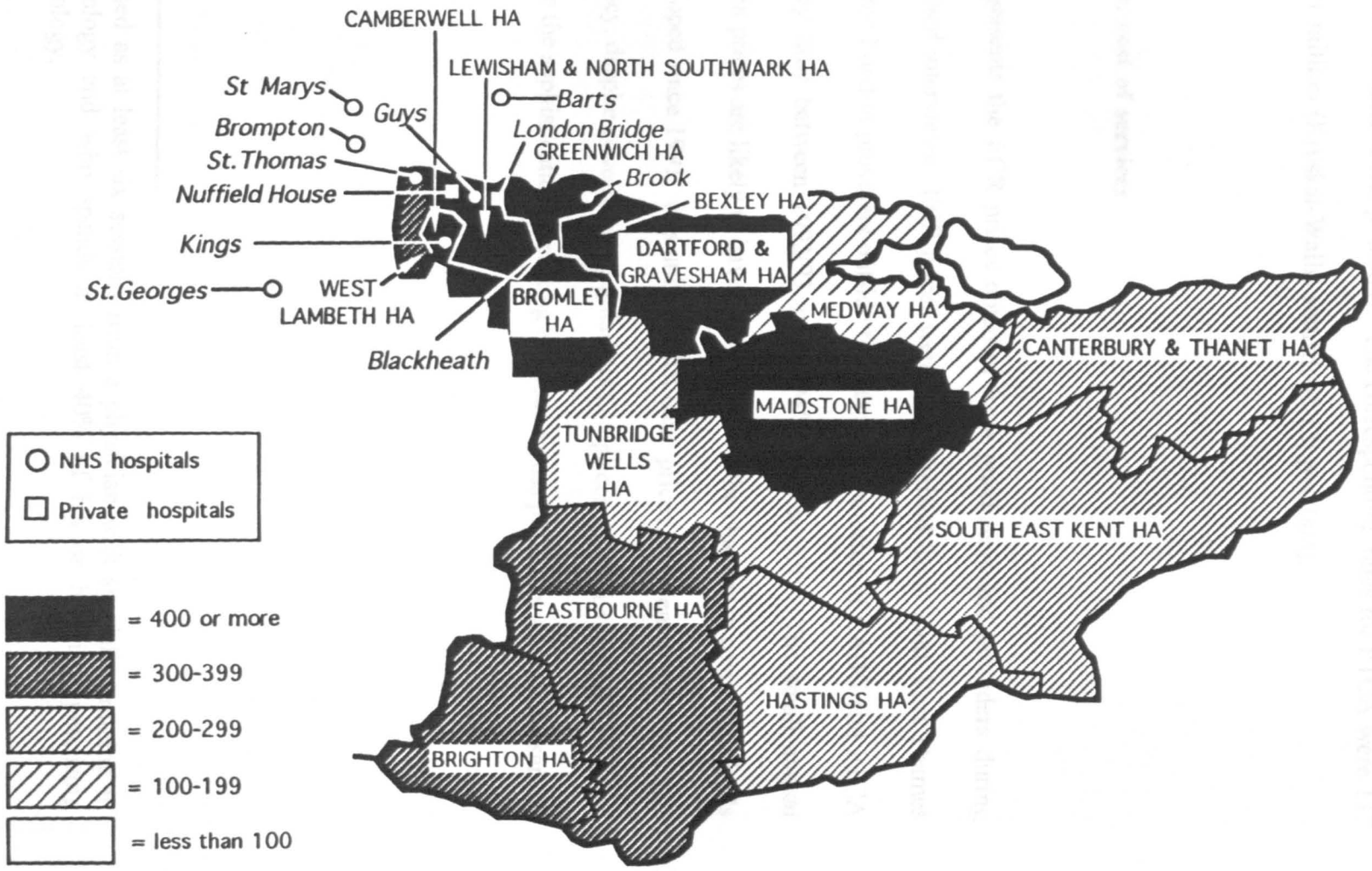


Figure 5.6: Age-sex standardised rates (per million aged over 24 years) of PTCA in South East Thames region: NHS cases (1992/93)



Second, the influence of there being a local cardiologist[12] on the District rate was assessed. Of the seven Districts which did not have a cardiologist, the mean rate for CABG in 1993/94 was 358 per million compared with 589 per million for the other 38 Districts (F statistic=10.4; p=0.003). The corresponding rates for PTCA were 117 and 323 per million (Kruskal-Wallis statistic=8.12; p=0.004).

5.5 Results: cost of services

Table 5.9 presents the ECR prices obtained from purchasers and providers during semi-structured interviews. ECR prices were also obtained from South East Thames purchasers for London providers outside the Region. The price of CABG and PTCA changed very little between 1992/93 and 1994/95 (Table 5.9). The small annual differences in prices are likely to have been caused by the changes in costing methods which developed since 1991. It is unlikely that these prices represented true costs and thus efficiency, despite government regulations that prices should equate with average cost, because the sophistication of costing methods across providers was not the same.

[12] Defined as at least six sessions from a physician with specialist training in cardiology and who spends at least 40% of his or her time practising cardiology.

Table 5.9: Trends in the price of CABG and PTCA from 1992/93 to 1994/95

Region and provider*	CABG (£)			PTCA (£)		
	1992/93	1993/94	1994/95	1992/93	1993/94	1994/95
East Anglian	6,062	6,291	5,997	3,255	2,680	2,454
North Western Provider 1	7,169	6,592	6,922	N/A	N/A	2,500
North Western Provider 2	8,519	7,711	8,362	2,563	2,717	2,568
Greater Glasgow	N/A	5,788	5,714	N/A	N/A	1,728
South East Thames	N/A	N/A	4,397	N/A	N/A	2,527
Outer London Provider 1	6,066	6,334	6,500	1,900# 2,400~	1,984# 2,506~	2,600# 4,000~
Inner London Provider 2	N/A	N/A	4,299	N/A	N/A	2,138
Inner London Provider 3	N/A	N/A	4,631	N/A	N/A	2,500

* ECR prices are not presented for all providers in the study due to unavailability of data.
N/A=not available, # Simple, ~ Complex

All CABG prices observed in 1993/94 were within 15% of the RITA estimate (Sculpher 1994), with only one provider in North Western exceeding this cost. All PTCA prices, however, were over 20% lower than the estimated RITA price. This may indicate that costing methods for PTCA at this time were not as advanced as those for CABG. CABG prices for inner London for 1994/95 were substantially lower than those for providers in outer London or those in other Regions. This may indicate that providers in inner London were faced with greater competition which had driven down the costs of the service.

5.6 Summary

There were no significant changes in the availability of revascularisation services between 1991 and 1994 in terms of consultant staff. In contrast, the number of non-consultant cardiac surgical staff increased. This may have been the result of a policy aimed at reducing non-consultant's hours. The number of cardiac surgical beds fell in two regions and increased in two. Wide inter-regional differences were found which either decreased or stayed the same over time.

The NHS utilisation rate for CABG and PTCA increased between 1987 and 1994 but at a decreasing rate. There was also an increase in private provision, an increase in the age of patients and a decrease in the ratio of males to females undergoing the operation. Wide inter-regional and inter-district variation were found but decreased over time.

If it is assumed that the need for coronary revascularisation services is similar in each area wide variations in the availability and utilisation of this specialist service between regions and districts suggest that the marginal benefit and marginal costs have not been equalised indicating allocative inefficiency. But, as there are no routine data available on the need for the service the validity of this assumption cannot be adequately tested. Furthermore, no account has been taken of the variations in the cost or quality of the service provided, therefore it is difficult to state that such variations signify inefficiency. However, given that the spacial distribution of coronary revascularisation services were found to be highly unequal, especially for PTCA, it is probable that a

more equal distribution of resources would lead to improvements in efficiency. Variations in the availability and use of these services have decreased over time suggesting improvements in both efficiency and equality of access.

There was little change in the price of these procedures over time which may imply no change in productive efficiency, an improvement in real terms or an improvement in the costing methods. Prices were found to vary between providers, probably due to differences in costing methods rather than differences in efficiency.

The variation observed in the utilisation rate between Regions and Districts was mainly due to differences in supply, both availability of services and differences in clinical judgement. Large variations in the use of PTCA was expected as it was a relatively new technology and the provision of CABG was still expanding. A further reduction in variation may be expected over the coming years as the availability of revascularisation services increase. However, the contracting process may work against this as responsibility for purchasing these services is devolved from Regions to smaller purchasing units in the form of DHAs and GPFHs. The nature of the contracting process and its effect on these services will now be discussed.

CHAPTER 6

THE DEVELOPMENT OF CONTRACTING:

A LONGITUDINAL ENQUIRY

6.1 Introduction

This part of the thesis describes the views of purchasers and providers of the two specialist services (CABG and PTCA) over the first three years of the reforms in the study regions defined in Chapter 5. First the evolution of contracting is described. Second, the nature of the market is assessed, and finally the problems faced in the first year are compared with experiences in the third year.

6.2 Methods

A series of semi-structured interviews were carried out during July and August 1992, 1993 and 1994 with a sample of purchasing agencies and providers of CABG and PTCA in four Regions of the UK. These were South East Thames Region, North Western Region, East Anglian Region and Greater Glasgow, including Lanarkshire and Arran/Ayrshire.

The business managers responsible for cardiology and cardiothoracic contracts in all ten NHS providers in the four Regions were interviewed in each of the three years. Thirteen purchasers were selected with the advice of local NHS staff as being particularly interested and active in contracting for these services. They included regional and district health authority staff and, in 1994, GPFHs. The interviews were concerned with the respondents' experiences of commissioning these two specialist services. The interviews lasted approximately one hour and information was recorded

by either making notes during and after the interviews or by audio-taping. The data obtained were categorised according to the five principle issues which emerged. For purchasers the categories were: responsibility for purchasing; types of contracts used; methods used to agree, place and monitor contracts; type of relationship with the main provider; and problems that had occurred. For providers the categories were: types of contracts used; methods used to price procedures; relationship with the main purchaser; issues regarding the type of competition; and problems that had occurred.

6.3 Results

6.3.1 Evolution of contracting

When the reforms were introduced in 1991 three Regions (including one in which commissioning did not start until April 1992) maintained the status quo as regards responsibility for purchasing the services (Table 6.1). Contracts were paid for centrally (by the Regional Health Authorities in the three English regions studied) by either top-slicing funds from district allocations or charging the district according to their level of use. The fourth Region devolved the responsibility of purchasing to district purchasing consortia from the outset. After the initial maintenance of a steady state, the other Regions also began to relinquish their control over the market and devolve the responsibility of contracting to either district purchasing consortia or individual districts. At the same time, the proportion of the population served by

Table 6.1: Key features of commissioning in the four study Regions from 1991/92 to 1994/95

		1991/92	1992/93	1993/94	1994/95
Responsibility for purchasing					
SE Thames	**BOTH**	Type 1	Type 3	Type 3	Type 3
N Western	**BOTH**	Type 2	Type 2	Type 2	Type 4
E Anglian	**BOTH**	Type 4	Type 4	Type 4	Type 4
G Glasgow	**CABG**	N/A	Type 1	Type 1	Type 1
	PTCA	N/A	Type 4	Type 4	Type 4
Resource allocation					
SE Thames	**BOTH**	Steady state	Weighted capitation	Weighted capitation	Weighted capitation
N Western	**BOTH**	Steady state	Steady state	Steady state	Weighted capitation
E Anglian	**BOTH**	Steady state	Weighted capitation	Weighted capitation	Weighted capitation
G Glasgow	**BOTH**	Steady state	Steady state	Steady state	Steady state
Type of principal contract					
SE Thames	**BOTH**	Block	Block	Sophisticated block	Sophisticated block
N Western	**BOTH**	Block	Block	Block	Sophisticated block
E Anglian	**BOTH**	Cost and Volume	Cost and Volume	Cost and Volume	Cost and Volume
G Glasgow	**CABG**	N/A	Cost and Volume	Cost and Volume	Cost and Volume
	PTCA	N/A	Block	Cost and Volume	Cost and Volume
Length of contract					
SE Thames	**BOTH**	12 months	12 months	12 months	12 months
N Western	**BOTH**	3 year			12 months
E Anglian	**BOTH**	12 months	12 months	12 months	12 months*
G Glasgow	**CABG**	N/A	12 months	6 months	12 months
	PTCA	N/A	12 months	12 months	12 months

Notes:
Type 1: Regional purchasing in which Region established contracts with local providers and top-sliced funds for these services
Type 2: Regional purchasing in which Region contracted with providers and charged districts according to their level of use.
Type 3: District purchasing consortia in which the responsibility for purchasing these services has been devolved to districts who have formed purchasing consortia
Type 4: District purchasing in which the responsibility for purchasing was taken on by individual districts.
BOTH:CABG and PTCA. N/A: Not applicable
(* An agreement was sought from all main purchasers for a seven year commitment although contracts would still be issued on a one year basis)

fund-holding general practices increased with the effect that the responsibility for purchasing CABGs and PTCAs increasingly shifted from purchasing authorities to the patient's own GP.

Meanwhile, the Department of Health introduced a new weighted capitation formula in 1991 to fund regions and it was recommended that they in turn should use it to allocate resources to district purchasing authorities. Each region slowly phased in the use of this formula to fund districts so that its use had become established in all Regions except Greater Glasgow by 1994/95. The new formula, based on capitation adjusted for age and a measure of need, caused a redistribution of resources creating per-capita losing and per-capita gaining districts.

As the purchasing function developed with the advent of better information on unit prices and activity, districts and district consortia moved away from block contracts. Block contracts, where the purchaser pays the provider a fixed sum for access to a defined range of services to meet the demand from the purchaser's resident population, do not allow purchasers to increase the efficiency of resource use and place providers in a situation of uncertainty regarding their workload. Purchasers moved either to more sophisticated block contracts, where they set a target for the level of activity to be carried out based on projections of activity and unit costs, or to cost and volume contracts which are more precise as a fixed price is set for a specified target volume of treatment.

The length of contracts also changed. Initially, most contracts were for one year at

the end of which the need for the service was reviewed and the contract changed if required. One Region, however, chose to purchase services on a three year rolling contract so as to protect the service in the initial stages of the reforms. By 1994, hospitals were considering longer-term contracts to enable them to carry out service developments. A seven year commitment from purchasers had been negotiated in one Region but was unlikely to be translated into a seven year contract due to a reluctance by purchasers to commit themselves to any one provider for so long. So despite intentions, contracts in all four Regions in 1994/95 were still only for 12 months.

6.3.2 Nature of the market

When contracting was devolved to districts and district consortia from regions, providers were placed in the position of having to compete for contracts. Purchasers, both district health authorities and fundholding GPs, started to question the configuration of services and the traditional choice of providers.

Purchasers initially contracted at historical levels of activity with providers with whom they already had established links. As contracting developed, however, a spectrum of approaches to purchasing emerged. As regards volume, some purchasers said that they recognised cardiac surgery as a priority and sought to increase the level of activity so as to meet 'The Health of the Nation' targets [11]. In contrast, others continued to base contracts on historical trends in utilisation. As regards patient flows, the majority of purchasers did not change their referral patterns radically. Those that did were

influenced by price rather than claims of improved quality. Some purchasers reduced the number of providers with whom they contracted, though this was mainly the result of central planning initiatives such as the Tomlinson Inquiry in London [12], rather than market forces.

In general the contractual relationships between, on the one hand, purchasers and their main providers and, on the other hand, between providers and their main purchasers were stable (Table 6.2). In SE Thames Region the providers felt that the relationship was open because information about activity, costs and quality was shared freely with purchasers. This view of stability and openness was not held however by their purchasers who were actually in the process of altering their referral patterns and switching contracts. In contrast, the views of purchasers and providers appeared to be concordant in the other three Regions, in part because of the lack of alternative local providers.

Despite the contractual relationship between purchasers and providers being predominantly stable, all providers felt that they had to compete for contracts (Table 6.2). This competitive environment arose as a result of providers having to maintain their contracts with their main purchasers, compete for contracts from more distant districts, and compete for patients from fundholding GPs who were controlling an ever increasing proportion of the market.

Table 6.2: Key features of the relationship between purchasers and providers and providers responses to questions regarding the competitive environment in 1993/94.

	Providers: *'What is your relationship with your main purchasers?'*	**Purchasers:** *'What is your relationship with your main providers?'*	**Providers:** *'Do you compete for contracts?'*	**Providers:** *'Is the basis of competition fair?'*
SE Thames	Stable open contractual relationship	Short-term buying and selling arrangements	Yes	No, tendering process is unfair and Special Health Authorities have an unfair advantage
N Western	Stable contractual relationship	Stable contractual relationship	Yes	No, tendering process and regulation by Region is unfair
E Anglian	Stable long-term contractual relationship	Stable long-term contractual relationship	Yes	Yes
G Glasgow	Stable contractual relationship	Stable contractual relationship	Yes	Yes

Providers were divided in their views as to the fairness of competition. In SE Thames and N Western Regions they felt that competition through competitive tendering was unfair. They argued that purchasers assessed tenders with regard to the price but not the quality of the service provided. This concern was compounded by the feeling that prices were not considered representative of a provider's efficiency because of the different methods used to determine costs. Furthermore, it was felt that tenders were more likely to be offered to inefficient providers who, charging their main local purchasers full cost and retaining excess capacity could then charge other more distant purchasers at marginal cost to attract additional tenders. Providers also felt that, in the early years, London's Special Health Authorities had had an unfair advantage since they had been allowed to charge lower prices due to subsidies received for research and teaching.

6.4 Commissioning problems

6.4.1 Obstacles during the first year (1991/92)

In the first year of the reforms, when most Regions retained control over purchasing for these services and before the traditional means of allocating resources to districts gave way to weighted capitation, purchasers and providers struggled to deal with the problems the new contracting system imposed (Table 6.3). They faced five new challenges.

Table 6.3: Problems experienced by purchasers and providers in 1991/92 and 1993/94

	Problems experienced in 1991/92	**Problems experienced in 1993/94**
Providers	(1) Type of contract (2) Lack of routine information (3) Appropriate organisational level for purchasing (4) Uncertainty about demand (5) Achieving equality between purchasers (6) Lack of fair competition	(1) Uncertainty about demand (2) Lack of fair competition (3) Inability to carry out service developments (4) Problems related to fundholding GPs (5) Problems related to target waiting times
Purchasers	(1) Type of contract (2) Lack of routine information (3) Appropriate organisational level for purchasing (4) Weighted capitation (5) Setting specialties against each other (6) Conflict with 'The Health of the Nation'	(1) Managing demand (2) Conflict with 'The Health of the Nation' (3) Difficulties with price comparability (4) Lack of information on patient outcomes (5) Loss of resources under weighted capitation

(a) Handling logistics

The overriding problem faced by both purchasers and providers was handling the complexities of the new system including the type of contract used, the lack of routine information on which to base contracts and the appropriate organisational level for purchasing cardiac services. Block contracts were high risk for providers and many found that their actual level of activity exceeded the anticipated level leading to a financial loss. In contrast, cost and volume contracts caused waiting lists to grow because as the number of emergencies rose elective cases were usurped. Meanwhile, block contracts gave no guarantee to purchasers as to the volume and type of work that would be carried out and cost and volume contracts were difficult to define due to the inability of providers to price their services according to case-mix. Lack of information on which to base contracts was a limiting factor for both parties. Providers were concerned about the expense they faced in collecting data on the cost, activity and quality of services. Purchasers, unable to make comparisons between providers on the basis of quality due to a lack of uniform indicators, were having to base their choice on price alone. Even when a purchaser had placed a contract, monitoring the service was again hampered by lack of data.

The appropriate organisational level for purchasing was a concern both for providers and purchasers. Providers found it easier to negotiate contracts which covered more than one district as this avoided the time and expense of negotiating lots of small volume contracts with their inevitable risks. On the purchasing side there was a conflict between Regions and Districts about who should be responsible for

purchasing. The former argued that Districts did not have the necessary skills and that if these services were purchased on a regional basis equality of access could be ensured. However the Districts argued that they were in a better position both to assess the needs of their resident population and to choose between competing demands.

(b) Managing demand

Providers faced difficulties in managing demand for their services as they were uncertain about the actual number of patients that would be referred to them. This in turn both reflected the difficulties purchasers faced in coming to terms with their new function, which sometimes led to contracts being agreed after the financial year had begun, and the impact of the introduction of weighted capitation. The new funding formula meant that some provider units situated in per-capita losing districts suffered a reduction in income which in turn caused problems for their purchasers who, as a consequence, had to cover a higher proportion of the provider's fixed costs.

(c) Achieving equality of access

Providers became aware of their inability to provide a fair and equitable service to their various purchasers. They found the clinical priority of patients was being distorted by the amount of resources purchasers were allocating for these services. Quite often providers completed a contract for a purchaser who still had urgent patients waiting to be treated. Meanwhile contracts with other purchasers were

continuing in which patients in less need of urgent attention were being treated. Providers were frustrated with their powerlessness for treating patients according to clinical need.

(d) Unfair competition

Some providers considered the basis of competition unfair. Well-established providers were thought to be able to compete more effectively than those who were trying to develop their service. Also some providers felt there was too much central control over the market which tended to favour certain providers over others.

(e) Facing conflicts

Purchasers found they were coming up against several conflicts. First, in setting priorities for health care, they felt that involving clinicians from the provider units in discussions about how to choose between competing needs for health care would result in setting specialities against each other. Second, purchasers found that contracting could be in direct conflict with 'The Health of the Nation' policies as contracting rewarded purchasers who achieve maximum efficiency gains as measured by the Efficiency Index [182,183]. As the definition of efficiency was based on maximising patient activity from the resources available it followed that purchasers achieved higher efficiency gains by increasing hospital activity rather than by moving resources from treatment to prevention, a strategy that was believed to be more likely to meet the goals set in 'The Health of the Nation'.

6.4.2 Obstacles during the third year (1993/94)

Two years later, when contracting had become better established, some of the early problems had resolved, some remained and some new ones had emerged (Table 6.3).

(a) Problems solved

Handling the logistics of contracting was no longer seen to be as serious a problem for purchasers and providers due to the skills that had been developed over the preceding three years. Routine data on costs and activities of cardiac services were being collected so that more sophisticated contracts could be used. This, to a large extent, had taken much of the uncertainty out of contracting.

(b) Problems remaining

Providers were still concerned about how to manage demand for cardiac services. They were experiencing problems with contractual volumes being exceeded because of an increase in the number of emergencies and an overall increase in referrals. They were also still concerned about their inability to treat patients solely according to clinical need.

Purchasers had also become increasingly concerned about the dramatic increase in demand for CABG and PTCA by their resident population over the previous few years. Reasons for the increase were firstly that cardiologists from specialist centres

had set up more clinics in district general hospitals, particularly in districts with traditionally low referral rates, secondly they were conducting out-patient sessions in fundholding general practices, and thirdly diagnostic facilities, including angiography, had been developed in some district general hospitals. The resulting increase in demand from traditionally low referring districts had not been offset by a decrease in districts with historically high referral rates. Purchasers who were losing resources under weighted capitation were finding it difficult to reduce their commitment to these services in view of increasing demand. As a result, greater pressure was put on reducing expenditure on other services.

Lack of fair competition was still causing a problem for providers though the nature of their concern had changed to that of pricing. Many felt that they were put at a competitive disadvantage as a result of being efficient and pricing their services at true average cost. Other providers with much lower prices were felt to be distorting the market in a variety of ways including using cardiac services as a 'loss leader' to attract business for other services, subsidising the service through monies received for research functions, cross-subsidising between services (which had been banned by the NHS Management Executive), or charging local purchasers the full cost while allowing other purchasers to use their services at marginal cost.

Lack of data on the quality of the service remained a problem for purchasers who were continuing to select providers on the basis of price. However, they found it was almost impossible to make meaningful comparisons of prices because providers did not all use the same cost accounting systems, apportionment rules and methods of

product specification. They felt that price alone could not be used as an indication of efficiency unless all providers used the same method of pricing and achieved the same outcome.

Purchasers were also still finding that contracting sometimes conflicted with the objectives of 'The Health of the Nation'. Purchasers argued that the more of their patients that were treated, the more credibility they received because treating patients was easily quantifiable while promoting health was not.

(c) New problems

Several new problems had emerged for providers. First, providers became increasingly concerned about the future development of their services. Demand for the service had risen with no increase in the amount of resources available. Providers therefore found that their ability to carry out service developments was limited. Second, growth in the number of fundholding GPs added to the existing equity problems. Although providers generally did not have an explicit policy of giving the patients of fundholding GPs a better service, several found that as a result of market pressures and the need to maintain their share of the ever increasing market controlled by fundholding GPs, they had to provide a quicker, cheaper and sometimes better quality service than that provided for district purchasers. Third, although target waiting times were welcomed by providers, many found that they were either having to distort clinical priorities in order to achieve them or refer non-urgent cases back to their GPs rather than put them on a waiting list. This problem had arisen because

many purchasers were still buying services on a historical basis and were not basing their decisions on the need to achieve the 12 month inpatient waiting time target.

6.5 Summary

There was a complex web of inter-connected problems which, in general, caused more problems for purchasers than providers initially but which appeared to be of increasing concern to providers. Clearly, the purchasing function developed considerably over the last four years and the contracting process became more sophisticated. The majority of Regions relinquished their control over the market for specialist services and devolved the responsibility to districts, district consortia and GPFHs whose purchasing skills developed. There remained a lack of appropriate data on activity and costs on which to base contracts, however purchasers dealt with this problem by creating sophisticated block contracts, where an agreement was set between the two parties on a target level of activity to be carried out for a fixed sum which did not require perfect information.

Despite the development of contracting, purchasers and providers continued to express misgivings about the way specialist services were commissioned. Purchasers found that the increase in demand for CABG and PTCA, in part brought about by initiatives set up by providers, put an ever increasing burden on their limited budget and more efficient use of resources was made difficult by their inability to make meaningful comparisons between the quality and cost of providers' services due to the paucity of

accurate and comparable information.

Providers' concerns seem to become more acute since the introduction of market mechanisms. In the first year of the reforms their main concern was how to deal with the contracting process. By the third year providers were more concerned about the future. Some providers experienced an increase in demand for their services with no concurrent increase in the resources available. This problem was exacerbated in some districts by the effects of the new resource allocation formula. Although some providers attempted to secure longer term contracts to create greater stability and thus enable service developments to be carried out, purchasers were reluctant to commit themselves for longer than 12 months. Providers felt they were also subject to unfair competition in the market place and an inability to maintain clinical need as the basis of selecting patients.

In summary, the contracting process developed considerably since its introduction in 1991 and purchasing skills became more sophisticated. However, given the number of problems faced by both purchasers and providers it is not certain whether the impact the contracting process had on social welfare was positive or negative. One of the main obstacles which seemed to prevent greater efficiency from being achieved was the inability of purchasers to make cost and quality comparisons between providers. Purchasers were therefore unable to choose the most efficient provider and providers were faced with unfair competition. This, coupled with the considerable administrative costs associated with contracting, would suggest that the impact of the reforms on social welfare had been, if anything, negative.

PART III

CHAPTER 7

MANAGING DEMAND:

A CASE-STUDY

7.1 Introduction

The quantitative and qualitative analyses have demonstrated the changes which have occurred since 1991. Although it was not possible to attribute confidently these trends solely to the effects of the NHS reforms because of other policy changes occurring at the same time, it was possible to highlight areas where greater efficiency and equity were achieved and areas where more could still be achieved. To explore this further, it is necessary to consider these findings in the light of the economic principles outlined in Chapter 3.

This chapter will: (1) discuss the evidence from the quantitative and qualitative analyses; (2) consider a strategy for improving efficiency through the contracting process, which involves the more effective management of demand; and (3) assess the scope for achieving greater efficiency through an audit of the current management of three hospital's waiting lists.

7.2 Discussion of the evidence

The quantitative analysis demonstrated the trends which occurred during the period from 1987 to 1994 with respect to the availability, use, and cost of coronary revascularisation services. There was little consistent change in the availability of resources over time, except for the increase in non-consultant cardiac surgical staff. The wide inter-regional variations in staffing and beds either decreased or stayed the

same. In contrast, the utilisation rates increased steadily over the same time period, though the rate of increase varied between places. More significant were the geographical variations found between regions and districts. For CABG the amount of variation decreased over time, especially in those Regions where the initial variation had been high. For PTCA the amount of variation between Regions and Districts remained high. Finally, the price of both procedures, especially PTCA, varied significantly between hospitals.

The decrease of variations in resource availability and resource use suggest a move towards greater efficiency and equality of access. However, the large remaining variations in the availability, use and cost of services, especially for PTCA, indicated that greater efficiency gains were still possible.

The qualitative analysis described the evolution of the contracting process and the problems experienced by purchasers and providers between 1991 and 1994. The responsibility for purchasing these services was devolved to districts and GPFHs whose purchasing skills had become more sophisticated with time. However, the ability of the contracting process to secure greater efficiency gains and equality of access was prevented by a series of obstacles, mainly caused by the effects of market failure. Purchasers, faced with an ever increasing demand for these services, were unable to choose the most efficient provider because of their inability to make meaningful comparisons between providers with respect to the cost and quality of care due to the paucity of accurate and comparable information. Providers, faced with imperfect competition and an inability to plan for the future development of their

services, may have developed opportunistic or monopolistic tendencies which, if not adequately controlled by the government or purchasers, would lead to inefficiency. The increase in GPFHs and the introduction of waiting time targets were clearly causing a number of equity problems preventing greater equality of access being achieved.

In short, the decrease in variations in the availability and use of coronary revascularisation services and the increase in the sophistication of contracting suggest the reforms may have been instrumental in increasing efficiency and equity. However, the large variations which persist and the contracting problems which remain suggest that the introduction of market mechanisms into the NHS is still a long way off achieving an efficient allocation of resources.

7.3 A strategy for improving efficiency

There are a number of reasons why market mechanisms have failed to achieve an efficient allocation of resources in the NHS. These reasons, outlined in Chapter 3, relate to market failure and inappropriate regulation. One of the major obstacles seems to be imperfect information on the need for the service, the appropriate level of use, the price and the quality of care. If greater efficiency is to be achieved purchasers need to be able to make comparisons between providers with respect to the price and quality of care and to ensure that those patients who need revascularisation services gain access (appropriate utilisation) and that patients receive surgery in an

appropriate time period (appropriate prioritisation). A strategy for improving efficiency therefore needs to encompass an improvement in the information available to both purchasers and providers through clinical audit and guideline development, thus allowing purchasers to manage the market for revascularisation services more effectively.

As most revascularisations are performed as elective rather than emergency procedures, the management of demand for coronary revascularisation procedures takes place predominantly on waiting lists. Hence, more effective management of waiting lists could potentially lead to improved efficiency by ensuring that the right patients got treated at the right time. At present the majority of providers manage waiting lists using informal criteria and decisions about who should be treated when are made on an *ad hoc* basis by the clinicians involved. The appropriateness of this method of managing waiting lists first needs to be audited so as to assess the scope for improving efficiency and the potential for developing guidelines to manage coronary revascularisation waiting lists more effectively.

7.4 Current waiting list management

The audit of current waiting list management was confined to CABG. Cardiac waiting lists are generally longer than those for PTCA and have received more attention from the government and the public. The objectives of this study were: (1) to describe how providers currently manage their patients on cardiac surgical waiting lists; (2) to assess the extent to which such management is appropriate; (3) to identify the factors that influence the speed of treatment; and (4) to evaluate the effect the reforms and other factors have had on these processes.

7.4.1 Methods

Data on 1594 patients who had undergone CABG in 1992 and 1993 in three London providers were collected retrospectively from the providers' cardiac surgical database. Only patients who underwent CABG without any other procedure were included. Information was collected on each patient's waiting time, age, sex, hospital waiting list priority category, angiographic findings, angina status and left ventricular function. The actual waiting time was measured in days from the date of placement on the waiting list to the date of surgery. Where available, data were also collected on coronary heart disease risk factors which included a history of smoking, diabetes, hypertension and obesity.

The appropriateness of the informal methods used by the three hospitals were assessed against a set of criteria developed by a Canadian consensus study [173,184,185]. The criteria, known as the Urgency Rating Score, were developed by a panel of cardiologists and cardiac surgeons. The panel agreed on the clinical factors affecting risk of delay, which were then combined into 438 hypothetical cases. Each panellist rated each case on a scale made up of seven time-frames (from immediate revascularisation to 6 months) which represented the maximum acceptable delay in Canada before revascularisation.

The score was developed on the assumption that patients with a higher risk of ischaemia-related adverse events should get priority. Risk was determined by a patient's coronary anatomy and angina status (based on the Canadian Cardiovascular Society's classification system). The Canadian study produced a table of average urgency scores for patients on this basis, adjusted for poor left ventricular function or high ischaemic risk. The resulting score indicated, in a Canadian context, the maximum acceptable waiting time, deemed to be 6 months.

The Canadian scoring system was adjusted for this study to take into account both the longer waiting times for CABG in the UK and the data available on the providers' databases. First, the New York Heart Association (NYHA) classification of angina was used instead of the Canadian Cardiovascular Society classification because that is the system UK clinicians use. They are however, similar [186]. Second, patients' scores were not adjusted for high ischaemic risk (judged by exercise test results) as this information had not been included in the databases. Third, the maximum

acceptable waiting time was extended from 6 to 12 months to reflect the reality of longer waits in the UK. Table 7.1 shows the adapted average urgency scores used in this study and Table 7.2 shows the maximum acceptable waiting times for each of those scores. Each patient was assigned an urgency score using these criteria.

The actual waiting time each patient experienced was compared with the appropriate waiting time, determined by the adapted Canadian Urgency Rating Score. Other variables were also analysed to assess whether factors other than angina status and angiographic findings determined priority on the waiting list. The degree of association between the actual waiting time and the two continuous variables (patient's appropriate waiting time and age) were assessed using Pearson correlation coefficients. The statistical significance of any association between actual waiting time and the categorical variables (sex, smoking, diabetes, hypertension and body mass index (BMI)) were assessed using a Chi-squared test. For the purposes of this analysis waiting times were categorised into three groups: less than one month, one to six months, and greater than six months. This corrected for the non-normal (positively skewed) distribution of the waiting time data.

Table 7.1: Urgency Scoring System (Adapted from the Canadian Consensus Study Scoring System [173]

Clinical Severity	NYHA I/II Stable angina	NYHA III Stable angina	NYHA III Unstable angina	NYHA IV Stable angina	NYHA IV Unstable angina
Left main stem	5.4	4.85	4.75	3.4	2.15
3 VD and LAD	6.15	6.0	5.5	3.9	2.55
3 VD and no LAD	6.45	6.35	5.8	3.9	2.65
1-2 VD and LAD	6.8	6.55	5.8	4.05	2.90
1-2 VD and no LAD	6.95	6.65	6.15	4.15	3.05

Adjustment of score:(subtract number below from urgency score)

Poor LV function (EF <30)	0.2	0.2	0.2	0.2	0.2

NYHA=New York Heart Association, a classification of effort angina
VD=vessel disease
LAD=left anterior descending (proximal stenosis)
LV=left ventricular
EF=ejection fraction

Table 7.2: Urgency/appropriateness rating scale (adapted from the Canadian Consensus Study urgency rating scale [173]).

Urgency Score	Minimum and maximum acceptable waiting times*
1-1.9 Emergency	Immediate
2-2.9 Extremely Urgent	Within 24 hours
3-3.9 Urgent	24 to 72 hours
4-4.9 Semi-urgent	73 hours to 14 days
5-5.9 Short-list	15 days to 3 months
6-6.5 Delayed	4 to 12 months
>6.51 Marked delay	Over 12 months#

* Appropriate waiting times reflect those employed by the Society of Cardiothoracic Surgeons pilot national database study.
# This category no longer exists since the Department of Health announced a standard of a maximum waiting time of twelve months for CABG.

The representativeness of waiting list management in the three hospitals audited was assessed by analysing the extent to which patients were waiting longer periods for CABG than their surgeons had planned in the three London providers compared to a sample of other hospitals. The sample of hospitals (10) selected were those from the four study Regions (South East Thames, East Anglian, North Western and Greater Glasgow) outlined in Chapter 5. The ten hospitals provided information on the priority category to which patients had been assigned to when put on the waiting list for surgery. These data were extracted from the case-notes of 50 consecutive patients in each hospital treated from April 1 1992.

Explanations for the results were sought from purchasers and providers. During the interviews outlined in Chapter 6 they were asked the following two questions: '*how are patients prioritised for cardiac surgery*' and '*do you consider the process to be efficient and fair?*'. These data were supplemented with published information.

7.4.2 Results

(a) Data completeness

Seventy-five patients (5%) were excluded from the study because the date of placement on the waiting list was not available (Table 7.3). The data required to assign an urgency score to each patient was 100% complete for three variables (severity of angina, angiographic findings, angina status) and 83% complete for one (left ventricular function). Data completeness on other coronary heart disease risk factors (age, sex, smoking history, diabetes, hypertension and obesity) ranged from 69% to 100% with age being the only variable available from all three providers.

Table 7.3: Details of patients referred for CABG

Patient Characteristics	Hospital 1 Number	(%)	Hospital 2 Number	(%)	Hospital 3 Number	(%)	Total Number	(%)	Data completeness (%)
Total number of patients	816		420		358		1594		
Total number of patients excluded*	0		0		75		75		95
Severity of Angina									100
NYHA I/II	419	(51)	58	(14)	172	(61)	649	(43)	
NYHA III	255	(31)	237	(56)	68	(24)	560	(37)	
NYHA IV	142	(18)	125	(30)	43	(15)	310	(20)	
Angiographic findings									100
1-2 vessel disease	212	(26)	80	(19)	78	(27)	370	(24)	
3 or more vessel disease	512	(63)	268	(64)	200	(71)	980	(65)	
Left Main Stem >50%	92	(11)	72	(17)	5	(2)	169	(11)	
Angina Status									100
Stable	571	(70)	295	(70)	238	(84)	1104	(73)	
Unstable	245	(30)	125	(30)	45	(16)	415	(27)	
Left ventricular function									83
EF > 50 (Good)	258	(40)	262	(72)	133	(54)	653	(52)	
EF 30-49 (Fair)	311	(48)	79	(22)	83	(34)	472	(37)	
EF < 30 (Poor)	84	(12)	21	(6)	29	(12)	134	(11)	

* These patients were excluded from the analysis as the date when they were put onto the waiting list had not been entered onto the provider's cardiac surgical database.
NYHA=New York Heart Association classification of angina, EF=ejection fraction. BP, blood pressure

Table 7.3 (cont) Details of patients referred for CABG

Patient Characteristics	Hospital 1 Number	(%)	Hospital 2 Number	(%)	Hospital 3 Number	(%)	Total Number	(%)	Data completeness (%)
Age (Mean, years)	60		60		60		60		100
Sex									81
Female	167	(20)	63	(15)	NA		230	(19)	
Male	649	(80)	357	(85)	NA		1006	(81)	
Smoking History									72
Non-smoker	328	(40)	NA		87	(31)	415	(38)	
Ex-smoker	379	(46)	NA		182	(64)	561	(51)	
Smoker	109	(14)	NA		14	(5)	123	(11)	
Diabetes									72
Non diabetic	719	(88)	NA		224	(79)	943	(86)	
Diet/oral controlled	80	(10)	NA		49	(17)	129	(12)	
Insulin dependent	17	(2)	NA		10	(4)	27	(2)	
Hypertension									72
Non hypertensive	476	(58)	NA		158	(56)	634	(58)	
Hypertensive (BP > 140/90)	340	(42)	NA		125	(44)	465	(42)	
Obesity									69
Body Mass Index < 30	671	(86)	NA		245	(90)	916	(87)	
Body Mass Index 31-35	93	(12)	NA		18	(7)	111	(11)	
Body Mass Index > 35	14	(2)	NA		9	(3)	23	(2)	
Priority Category									98
Urgent (0-60 days)	357	(45)	227	(55)	17	(6)	601	(40)	
Soon (61-240 days)	178	(22)	95	(23)	47	(17)	320	(22)	
Routine (> 241 days)	268	(33)	88	(22)	216	(77)	572	(38)	

BP=blood pressure,NA=not available

(b) Patient characteristics

Over half the patients (57%) had a NYHA angina grade above II and 27% had unstable angina. The majority of patients (76%) had coronary artery disease of more than two vessels. Left main stem disease was present in 11% of the patients and poor left ventricular function in 11%. The mean age of the patients was 60 years (range 30-83) with a female to male ratio of 1:4.4 (Table 7.3). Hypertension was present in 42% of the group, 11% were current smokers, 14% had diabetes and 13% had a body mass index of over 30. The method of prioritisation used by the hospital to rank patients according to their clinical urgency was a system of three categories; urgent (0-60 days), soon (61-240 days) and routine (> 240 days). The highest proportion of patients fell into the urgent category (40%), followed by the routine category (38%) and the soon category (22%).

The mean time patients actually waited was 129 days with a range from 0 to 757. The actual time patients waited showed a skewed distribution with most patients waiting less than 6 months (67%) and only 10% waiting longer than 12 months (Figure 7.1). The median time spent waiting was 64 days and the mean urgency score was 5.42 (a higher score indicates lower severity). The range of urgency score categories showed a skewed distribution with most patients having an urgency score greater than 6 (62%) (Figure 7.2).

Figure 7.1: Actual waiting time for patients referred for CABG

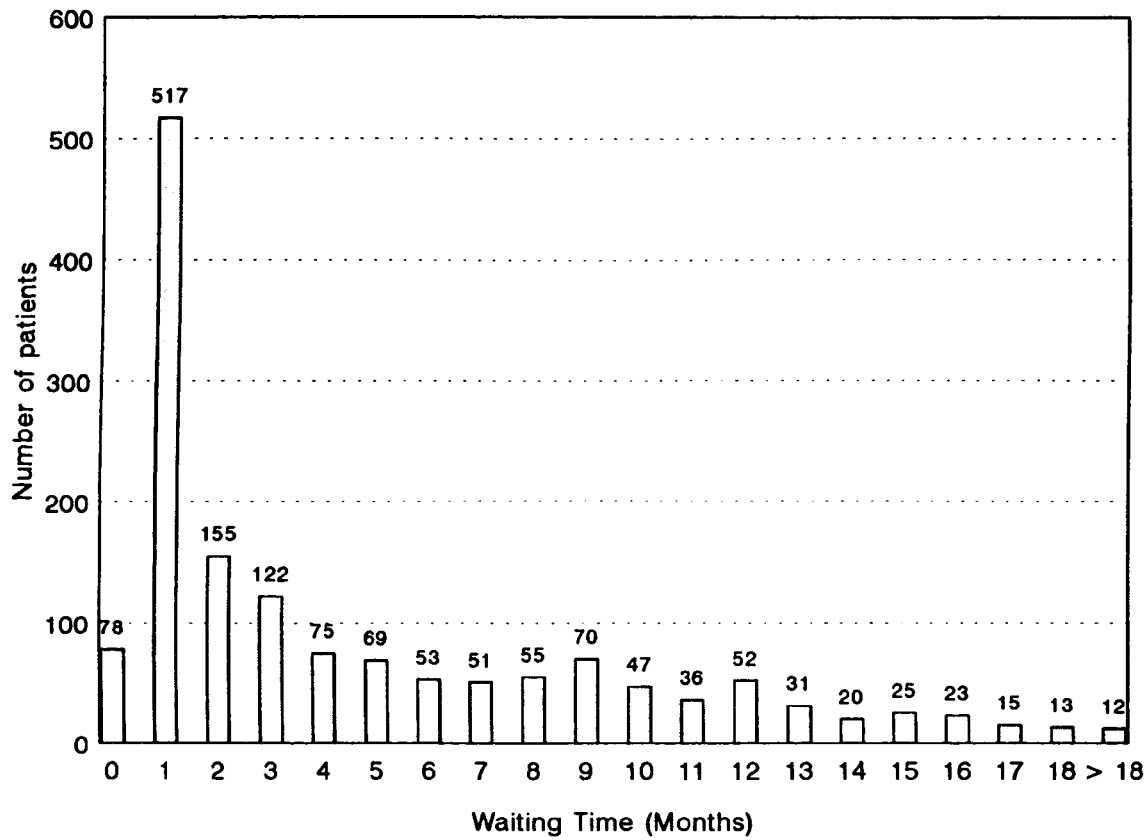
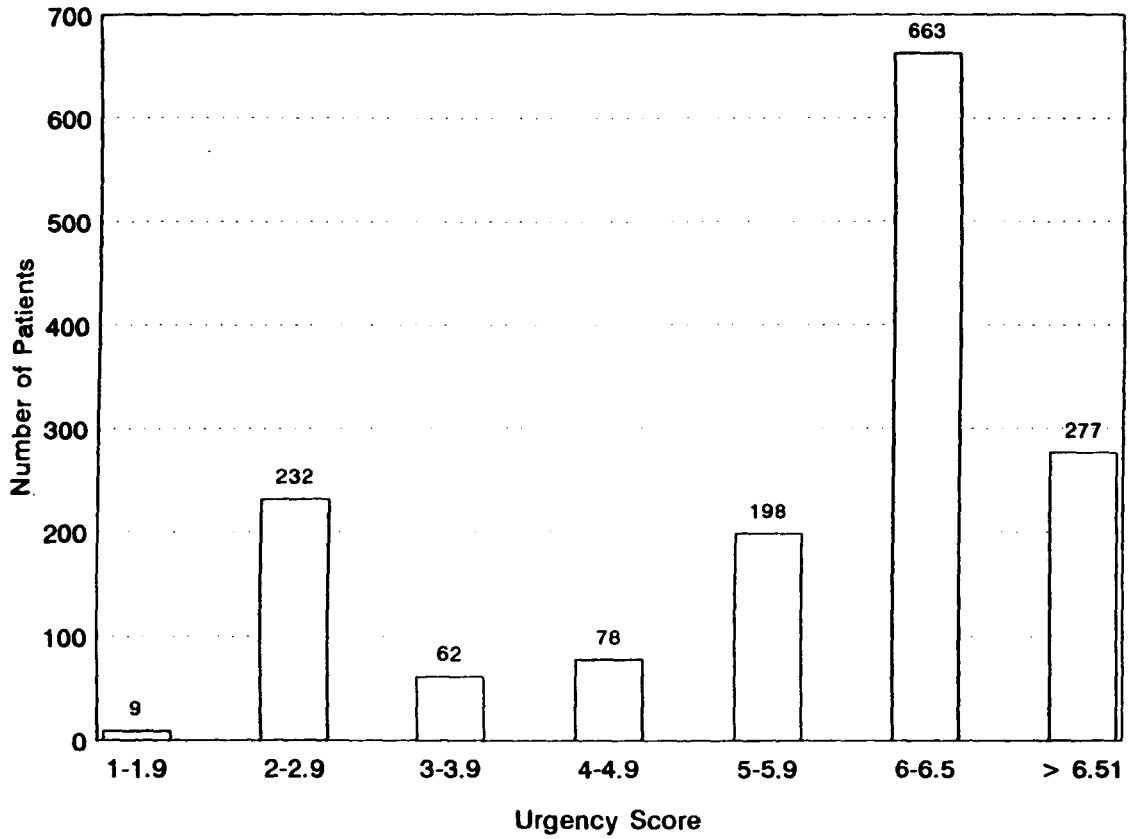


Figure 7.2: Distribution of Urgency Scores for patients referred for CABG



(c) Comparison of appropriate waiting time with actual waiting time

Patients with three-vessel disease and left anterior descending disease with stable angina (NYHA I/II) were the largest group (26%) within the urgency score categories (Table 7.4).

The actual waiting time was compared with the appropriate waiting time, defined by the urgency score. The strength of the association was only modest (Pearson's correlation coefficient=0.33, confidence intervals 0.29-0.38). Few patients were treated within the time considered appropriate for their risk of ischaemia-related adverse events. Figure 7.3 shows the proportions of patients who were treated on time, early or late by urgency category (data for Figure 7.3 are shown in Appendix VI). Cases were designated 'concordant' when their actual waiting time matched their appropriate waiting time defined by the urgency score. If they waiting longer they were designated as 'delayed' and if they were treated sooner they were designated as 'accelerated'. Only 38% of patients were treated within their designated period. However, 34% of patients had surgery earlier than their score indicated, and only 28% were delayed. Not surprisingly, delay was more likely for patients in the high (1-2.9) and medium (3.0-4.9) urgency categories than in the low categories and likewise, accelerated cases were more likely to be among the least urgent patients.

Figure 7.3: Concordance of patient's actual waiting time with the appropriate waiting time, as defined by the Urgency Score.

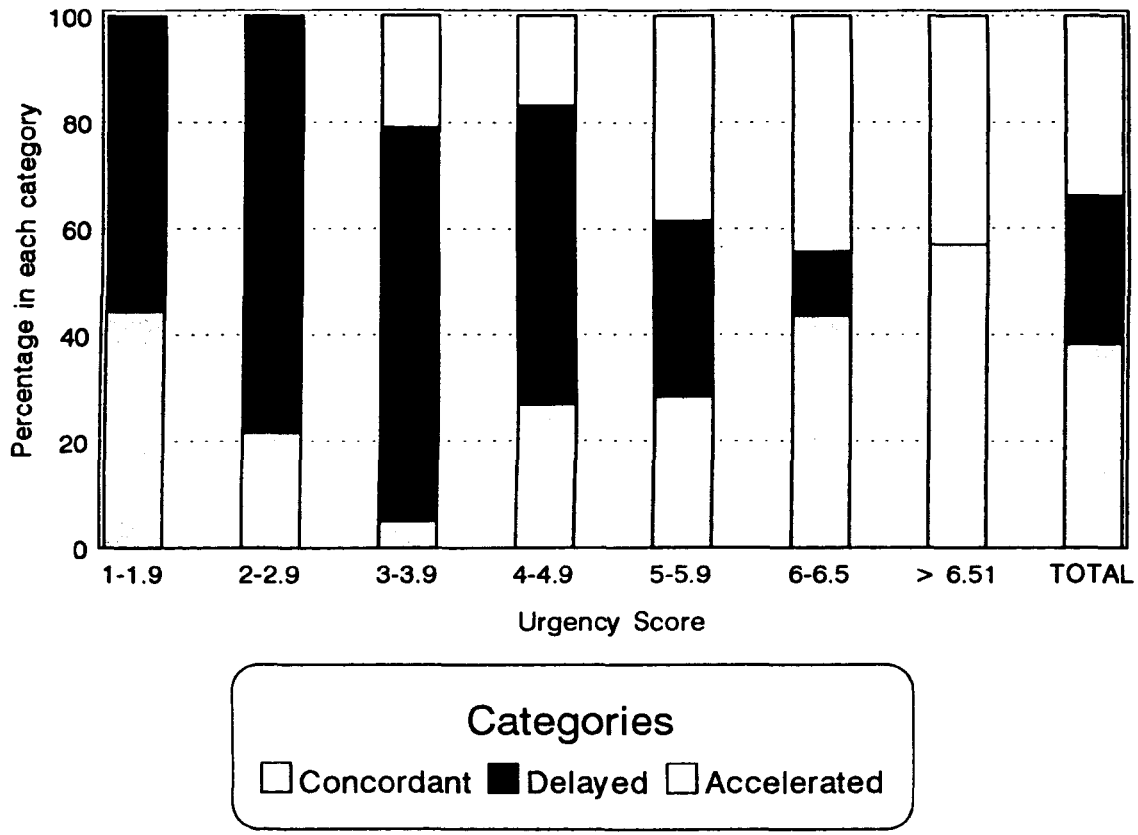


Table 7.4: Number (percentages*) of patients in each urgency score category

Clinical Severity	NYHA I/II Stable angina	NYHA III Stable angina	NYHA III Unstable angina	NYHA IV Stable angina	NYHA IV Unstable angina
Left main stem	43 (3)	59 (4)	12 (1)	9 (1)	46 (3)
3 VD and LAD	398 (26)	289 (19)	71 (5)	45 (3)	140 (9)
3 VD and no LAD	12 (1)	13 (1)	6 (0.4)	4 (0.3)	2 (0.1)
1-2 VD and LAD	180 (12)	82 (5)	23 (2)	6 (0.4)	53 (3)
1-2 VD and no LAD	16 (1)	3 (0.2)	2 (0.1)	1 (0.1)	4 (0.3)

* Percentages do not sum to 100 due to rounding.
NYHA=New York Heart Association
VD=vessel disease
LAD=left anterior descending (proximal stenosis)

(d) Comparisons of actual waiting time with other factors

The actual waiting time was compared with other factors to see whether criteria other than those included in the urgency score had been used systematically by clinicians to influence priority. Such factors might explain some of the observed variation between the appropriate and the actual waiting time. On univariate analysis, two factors were found to be significantly associated with actual waiting time. Women had shorter waits than men (99 v 132 days; χ^2=15.56, $p < 0.001$) and ex-smokers and lifetime non-smokers waited less time than smokers (127 v 135 days; χ^2=6.89, p=0.03). The

difference between waiting times for smokers and non-smokers is small (8 days) and therefore does not warrant further investigation. The difference between men and women can be explained by severity of disease as women were significantly more likely than men to have unstable angina (Odds ratio 2.00, confidence interval 1.47-2.73, $p < 0.001$), a variable which is included in the Canadian Urgency Rating Score. Once unstable angina was taken into account sex was not a significant predictor of waiting times (χ^2=0.99, p=0.61). Patient's age (Pearson correlation coefficient=0.05, confidence interval -0.02,0.08), diabetes (χ^2=0.55, p=0.76), hypertension (χ^2 0.80,p=0.67), BMI (χ^2=3.28, p=0.19 for a BMI of over 30, χ^2=3.21, p=0.20 for a BMI of over 35) were not significantly associated with waiting time.

(e) Inter-hospital comparison

Concordance of actual waiting times with appropriate waiting times ranged from 41% in hospital 1, through 40% in hospital 3, to 32% in hospital 2 (Table 7.5). The Figures for each hospital are shown in Appendix VII. Delay was more likely for patients in hospital 2 (36%). However, hospital 2 had more patients with NYHA angina grade III or IV and left main stem disease than the other two hospitals (Table 7.3).

Table 7.5: Concordance of patient's actual waiting time with the appropriate waiting time, as defined by the Urgency Score, for each Hospital.

Urgency Score	Concordant (%)	Delayed (%)	Accelerated (%)
Hospital 1	41.2	25.8	33.0
Hospital 2	31.7	36.4	31.9
Hospital 3	39.6	21.2	39.2
Total	**38.2**	**28.0**	**33.8**

(f) Representativeness

The actual waiting time was compared with the priority category the clinicians had allocated to each patient for each of the three London Hospitals and a larger sample of Hospitals covering a wider geographical area (Table 7.6). Cases were designated 'concordant' when their actual waiting time was the same as their priority category. If they had to wait longer they were designated 'delayed'; and if they were treated sooner they were designated 'accelerated'. Overall a similar proportion of patients were delayed in the three London Hospitals (11%) as were delayed in the larger sample of NHS hospitals (9%), although the range between hospitals was wide (0-32%). This suggests that all hospitals found managing waiting lists for CABG difficult and that the three hospitals chosen for this study were not significantly different from other cardiac centres.

Table 7.6 Concordance between priority rating and waiting time for CABG.

Hospital	Concordant (%)	Delayed (%)	Accelerated (%)
Study Regions			
1	62	32	6
2	82	0	18
3	28	6	66
4	68	2	30
5	40	0	60
6	9	2	89
7	59	22	19
8	67	4	29
9	80	10	10
10	77	3	20
Total Study Regions	**60**	**8**	**32**
London Hospitals			
1	68	11	21
2	65	18	17
3	35	1	64
Total London Hospitals	**61**	**11**	**28**

7.5 Discussion

The study revealed that most patients' waiting times were not concordant with a measure of appropriate waiting time, suggesting that patients were not prioritised accurately according to their clinical need. A large number were treated earlier than their ischaemic risk would indicate was necessary and this may have contributed to other patients with higher ischaemic risk experiencing delay.

The variations found between the measure of appropriate waiting time and actual

waiting times could be explained by three alternative hypothesis. First, the variations are a result of inappropriate informal prioritisation systems. Second, the variations are a result of the Canadian criteria (used as a 'gold standard' in this study) being unsuitable for use in a UK context. Third, the variations are a result of internal or external organisational factors creating difficulties in the implementation of any prioritisation systems, regardless of how simple or sophisticated. Each will be considered in turn.

7.5.1 Appropriateness of informal prioritisation systems.

The system of prioritisation used in each of the three London providers was based on the allocation of patients into one of three categories. Allocations were made by each individual clinician on an *ad hoc* basis often without the use of written criteria. As a result, some patients may have been classified differently by other clinicians. In addition, although clinicians in the same hospital may use similar criteria, clinicians at other hospitals may follow different indications. There seems to be ample scope for improving on these informal methods.

7.5.2 The suitability of the Canadian criteria

In order to evaluate whether the Canadian criteria are suitable for use in the NHS three issues need to be assessed: the appropriateness of the waiting time frames; the appropriateness of the clinical factors included; and the differences in patients and/or the disease between Canada and the UK.

The Canadian definition of appropriate waiting times for each urgency score was considered unsuitable for use in the NHS because waiting times have always been much longer in the UK. This was dealt with by replacing the Canadian waiting time categories with those used by the British Society of Cardiothoracic Surgeons (Table 7.2).

The clinical factors included in the Canadian Urgency Rating Score were considered suitable. The factors included were consistent with those factors, identified in Chapter 4, which have been shown to be associated with the greatest gains in health following revascularisation and with increased risk of short-term mortality while waiting. Despite agreement with the suitability of the criteria, it is possible that cardiac surgeons in the UK may weight some of the factors in the Urgency Scoring System differently or use other factors not incorporated into the scoring system. However, none of the factors studied were found to influence the speed of treatment once unstable angina had been taken into account. Factors not studied that may have influenced the waiting time for treatment included other clinical variables, such as cardiac enlargement, positive exercise test and coumarin treatment [136] and other socio-economic variables, for example, work status [187];

The differences in patients and/or disease is unlikely to affect the suitability of the Canadian Urgency Scoring System. Although the Canadian intervention rate has remained about twice that of the UK, this difference has been found to relate more to the finance and structure of the health services rather than to differences in levels of morbidity. No relationship has been found between international CABG rates and

death rates from CHD, national income, number of cardiologists or spending on health care [76].

7.5.3 The influence of internal and external organisational factors on any prioritisation system

(a) The contracting process

The contracting process has the potential for causing waiting lists to be managed inappropriately. This was the reason most often cited by providers. Waiting times may be determined by the agency responsible for paying for the patient's treatment. For publicly funded care, priority is determined by the resources the district health authority or general practitioner fundholder allocates to cardiac surgery. Furthermore, providers who are keen to maintain their share of general practitioner fundholder's resources may give fundholder's patients a quicker service, regardless of relative clinical need.

Further problems have occurred as a result of providers being unable to manage their contracted workload evenly over the financial year. If a provider completes a contract before the end of the financial year, untreated patients may have to wait until the beginning of the new financial year regardless of need, while patients with a lower priority referred by other purchasers are treated. The contracting process has also created the need for providers to retain a specific amount of excess capacity to treat unanticipated urgent referrals. If no such referrals occur the excess capacity is filled with patients who are contactable at short notice rather than those most in need [188].

(b) Waiting time policies

When the number of patients on the waiting list exceed available surgical resources, achieving the Patients' Charter waiting time target can result in the admission of patients whose waiting time is approaching the imposed limit at the expense of patients in more urgent clinical need but who have waited a shorter time. Waiting list initiative monies cause a similar problem. This initiative was introduced in 1987 with the aim of eliminating the longest waiting lists. However, the monies are often for specific patients designated by the length of waiting time rather than clinical need, again distorting clinical priority.

(c) Patient pressures and waiting list administration

There may be considerable and highly variable pressure from the patients themselves or from their families and general practitioners to admit them for surgery earlier than others with similar symptoms, making it difficult for the provider to select patients solely according to clinical need. Patients also distort the waiting list in other ways, for example, by delaying surgery due to work or leisure commitments.

The organisation of waiting lists makes it more difficult to select patients on the basis of clinical need [189]. The order of admission is dependent on how information about patients is stored and whether patients are easily contactable [188]. Patients contactable by phone and patients not working are more likely to be admitted.

7.6 Summary

The decrease in variations in the availability and use of coronary revascularisation services and the increase in the sophistication of contracting suggest the reforms may have increased efficiency, both productive and allocative, and equity within the NHS. However, the large variations that remain and the contracting problems which prevail suggest the introduction of market mechanisms into the NHS is still a long way off achieving an efficient allocation of resources.

The demand for coronary revascularisations procedures is predominantly managed by means of waiting lists. More effective management of waiting lists could potentially lead to improved efficiency by ensuring that the right patients got treated at the right time. An audit of waiting list management demonstrated that patients were often not treated within the appropriate time, as defined by a Canadian Urgency Score, indicating that they were not prioritised accurately according to their clinical need.

Three hypotheses were put forward to explain the variations found between the appropriate and the actual waiting time. First, the variations were a result of inappropriate informal prioritisation systems. Second, the variations were a result of the Canadian criteria being unsuitable for use in a UK context. Third, the variations were a result of internal or external organisational factors creating difficulties in the implementation of any prioritisation systems. All three contribute potentially to the mismatch between actual and appropriate waiting times.

The development of guidelines to prioritise patients awaiting CABG might improve efficiency and benefit patients, providers and purchasers of health care services. By ensuring a more appropriate ranking of priority for treatment morbidity and mortality associated with waiting might be minimised, though such benefits would need to be demonstrated. Such guidelines could be incorporated into the contracting process to ensure patients are managed more efficiently and equitably, allowing standards to be met without having to distort clinical priority and thus maximising the potential gains in health from this specialist service.

CHAPTER 8

DEVELOPMENT OF GUIDELINES:

THE URGENCY SCORING SYSTEM

8.1 Introduction

Patients were currently not always being managed in a way that maximises the potential benefits derived from coronary revascularisation services within the resources available. Long waiting times have always been a feature of the NHS. In Chapter 4 it was stated that the number of deaths which occur while waiting for CABG is low and that the number of patients whose symptoms deteriorate is unknown. However if it is assumed that the delay itself causes the death of patients on the waiting list and that those patients whose symptoms deteriorate while waiting are at increased risk of operative and postoperative death, then there is a case for developing guidelines to ensure that the number of deaths are minimised and that the waiting lists are managed efficiently and fairly.

Although such guidelines have been developed in other countries [173,176], none have yet been developed in the UK. The system of prioritisation used by clinicians in the UK was an informal one where allocations for surgery were made on an *ad hoc* basis by each individual clinician, often without the use of written criteria. As the previous Chapter demonstrated there seemed to be ample scope for improvement on these informal methods. The development of guidelines for prioritising patients awaiting coronary revascularisation was therefore recommended.

Three assumptions had to be made in the development of such guidelines. First, that their use, by ensuring that those patients at risk of adverse cardiac events are given precedence over those who can more safely wait, will reduce the number of

unnecessary deaths. Second, that those patients defined by the guidelines as being at high risk of preoperative mortality and morbidity while waiting were those for whom the potential gains in health from surgery were the highest. Third, that referral to the waiting list was appropriate, that is only those patients with an ability to benefit from the intervention gained access.

The aim of this part of the thesis was to develop guidelines that had the ability to prioritise patients according to their urgency of need. Having done that it would be possible to set a future research agenda for testing the three assumptions outlined above.

8.2 Developing a scoring system

The development of a scoring system involved the collaboration of three types of organisation: two health agencies in North Thames (Ealing, Hammersmith and Hounslow Health Agency and Brent and Harrow Health Agency), four provider units in North Thames Region (Hammersmith Hospital, Royal Brompton National Heart and Lung Hospital, St Mary's Hospital and Harefield Hospital), and an academic institution, the London School of Hygiene and Tropical Medicine.

Preliminary discussions regarding the nature of scoring systems took place between the health agencies and one selected provider, the Hammersmith Hospital, which was selected because of its links with the newly developing UK National Cardiac Register.

It was decided that the scoring system should be multifactorial and had to be acceptable to all participating providers. In the development of any guidelines, purchasers can either collaborate with providers in developing locally-agreed guidelines or adapt published guidelines for local use. The second option was chosen, predominantly because the development of scientifically valid guidelines is extremely resource expensive. As the Canadian guidelines had been developed by a consensus panel of selected cardiologists and cardiac surgeons and had been used in clinical practice, it was thought appropriate that the North Thames system should incorporate a similar set of variables [173].

The first stage of development involved cardiologists and cardiac surgeons from the Hammersmith Hospital identifying the variables that needed to be included. The variables were the same as those used in the Canadian study (symptom status, coronary anatomy, ischaemia, and left ventricular function), though the subcategories for each variable and the weights assigned to each subcategory were different.

Symptom status was graded according to the Canadian Cardiovascular Society classification system [186] with an extra subcategory was added to reflect symptom stability (stable, recent deterioration, nocturnal angina). Coronary anatomy was divided into eight categories: left main stem stenosis with luminal occlusion of at least 50% and left dominant or occluded right coronary artery; left main stem stenosis with luminal occlusion of at least 50%; three-vessel disease with proximal left anterior descending (LAD) arterial involvement; three-vessel disease without proximal LAD arterial involvement; double-vessel disease with proximal LAD arterial involvement;

single-vessel disease with proximal LAD arterial involvement; double or single-vessel disease without proximal LAD arterial involvement; and normal. Ischaemia was defined on the basis of non-invasive tests, using heart rate at onset of myocardial ischaemia on treadmill testing to define the subcategories: greater than 130, 100 to 130; and less than 100. Left ventricular function was divided into three categories: poor (ejection fraction (EF) of less than 30); fair (EF of between 30 and 49); and good (EF of greater than 49).

The weights assigned to each factor were chosen by the group of Hammersmith clinicians based on their clinical experience of how predictive each risk factor was of preoperative mortality or morbidity. It was an additive scoring system where the resulting score fell into one of five categories: less than 10 points should be treated within 12 months; between 11 and 20 points, treated within 6 months; between 21 and 30 points, treated within 3 months; greater than 30 points, treated within 1 month; and emergency cases, which were not placed on a waiting list.

The second step was to obtain a wider consensus. Selected cardiologists and cardiac surgeons from the four London providers were invited to attend a consultation seminar. A number of representatives were present from each provider with the exception of St Mary's. The scoring system that resulted from the consultation seminar was sent to the cardiologists and cardiac surgeons at St Mary's to obtain their views. They considered no changes were necessary and accepted the system.

At the consultation seminar, views on the Hammersmith Hospital scoring system were

sought. The objective of the seminar was to reach a consensus on four issues: the appropriateness of the four clinical variables included; the appropriateness of the subcategories within each clinical variable; the weight which was assigned to each subcategory; and the suitability of the waiting time categories. A consensus was reached regarding the changes required for all four issues under discussion.

The resulting scoring system is shown in Figure 8.1. It was agreed that the scoring system could only be applied to patients on a surgical waiting list and therefore excluded emergency referrals. The four variables used in the Canadian system and the time frames suggested by the Hammersmith team were not disputed. The changes proposed at the seminar related to the subcategories of each variable and the weight given to each subcategory. In terms of the subcategories, the clinicians felt that 'rest pain in hospital', which was not included in the draft system, was a particularly bad prognostic symptom and therefore a good predictor of preoperative mortality. A separate category in the 'symptom status' section was added therefore to include this risk factor. With respect to ischaemia it was agreed that referring clinicians would decide whether the patient's exercise test was normal, equivocal, positive or strongly positive, rather than use the heart rate at onset of myocardial ischaemia. Given that some patients are unable to undertake exercise tests due to comorbidity, the referring clinicians would be required to allocate the patient to the most suitable category based on other clinical factors.

Figure 8.1: Urgency Scoring System

CLINICAL FACTOR	SCORE
1. SYMPTOM STATUS	
Angina Status	
0[ ] = Asymptomatic	0
1[ ] = No limitation of ordinary physical activity	2
2[ ] = Ordinary physical activity causes discomfort	4
3[ ] = Moderate/great limitation of ordinary physical activity	6
4[ ] = Unable to perform physical activity without discomfort	10
Symptom Stability	
0[ ] = Stable	0
1[ ] = Recent deterioration	5
2[ ] = Nocturnal angina	10
Rest pain in hospital, on maximum medical therapy	Yes [ ] No [ ]
2. CORONARY ANATOMY	
0[ ] = Normal	0
1[ ] = Single/Double vessel without LAD stenosis	1
2[ ] = Single vessel + proximal LAD stenosis	4
3[ ] = Double vessel + proximal LAD stenosis	6
4[ ] = Three vessel + no proximal LAD stenosis	6
5[ ] = Three vessel + proximal LAD stenosis	10
6[ ] = LMS > 50%	15
7[ ] = LMS > 50%, left dominant or occluded RCA	20
3. ISCHAEMIA	
Results of Exercise Test	
(if a patient has not had an exercise test the procedure to follow is; a patient with acute coronary syndrome should be allocated to box 3, other patients should be allocated to a box at the cardiologists discretion)	
0[ ] = Normal	0
1[ ] = Equivocal	2
2[ ] = Positive	5
3[ ] = Strongly positive	10
4. LEFT VENTRICULAR FUNCTION	
1[ ] = Good (ejection fraction >50)	0
2[ ] = Fair (ejection fraction 30-49)	4
3[ ] = Poor (ejection fraction <30)	6
WAITING LIST PRIORITY SCORE	[ ]

PRIORITY SCORE TIMING

1[ ] = < 11	1 year
2[ ] = 11-20 points:	< 6 months
3[ ] = 21-30 points:	< 3 months
4[ ] = > 30 points:	< 1 month
5[ ] = Emergency case, not referred onto the waiting list	

LAD=left anterior descending, LMS=left main stem, RCA=right coronary artery.

The weights were determined in two ways, by consideration of those used in the Canadian Urgency Scoring System (which had been generated by means of a regression based model) and by each individual clinician's experience of the impact of each clinical factor. The resulting weight defined the variable's ability in influencing the level of urgency for treatment. The only change thought necessary to the weights assigned by the Hammersmith team were those relating to the coronary anatomy. It was considered necessary to give more weight to patients with three-vessel disease and left main stem disease. The inflation factor thought necessary was agreed. The agreed Urgency Scoring System had a minimum score of 0 and a maximum score of 56.

8.3 Future research and audit agenda

The first assumption that underpins the scoring system is that it will improve efficiency as cases at high risk of sudden death, and cases likely to show improvement in the short-term, are given priority over those who can more safely wait thereby reducing the number of unnecessary deaths. In order to test this hypothesis the proposed scoring system will be validated prospectively in the four Hospitals. This will highlight for which group of patients delay is likely to cause either mortality or morbidity. The scoring system, as it stands at present, is based on a consensus of local clinicians and is therefore open to varying opinions. The prospective analysis will allow it to be validated and adapted to locally-agreed and accepted criteria. It is envisaged that this process of validation will be ongoing in order to modify the

Urgency Scoring System in the light of changing technology and the patient population.

The proposed study design for the prospective analysis is a before and after study. Baseline data will be collected prospectively for a period defined by the study size required to show a significant change after which the urgency score will be put into routine use and evaluated prospectively for a time period matching the recruitment period. The study will aim to analyse the natural history of the disease while waiting. A comparison will be made between appropriate and actual waiting times and between outcomes (mortality and morbidity) before and after implementation. The actual process of implementation will also be evaluated including the constraints experienced. The reasons why patients deviate from appropriate waiting times will be explored.

To evaluate the effect of the Urgency Scoring System over the long-term, it is proposed that a cohort of patients recruited in the prospective study be followed-up for five years to assess its effects on long-term mortality and morbidity. The system will be reviewed annually and modified as necessary.

The second assumption was that patients at high risk of adverse consequences of waiting for coronary revascularisation, as defined by the score, were also those with the potential to benefit significantly from the intervention. In this context benefit is defined in terms of improvement in life expectancy and relief of symptoms. Conceptually this is simple - priority should go to those likely to show the greatest increase in life years, the greatest reduction in symptoms or a combination of the two.

As was seen in Chapter 4 RCTs have shown that CABG offers greater benefits than medical therapy to patients with three-vessel disease and left main stem disease. Poor left ventricular function and a positive exercise test also affect survival after surgery when combined with other risk factors. All four of these variables were included in the Urgency Scoring System. Given that there have been significant improvements in techniques since the RCTs were conducted, continued assessment of this association is required.

This could be achieved by following up those patients in the prospective study to see if those patients who were urgent cases as defined by the urgency score were also those with the potential to benefit significantly from surgery. Follow-up to 5 years assessing long-term outcomes.

The third assumption underpinning the guidelines was that selection of cases to join cardiac waiting lists was appropriate. Studies reviewed in Chapter 4 have demonstrated that this is not always the case. Despite the methods used in those studies being open to criticism, the significant variations in utilisation rates that exist in the UK (Chapter 5) suggest that access is not as appropriate as it could be. Access to cardiac surgery waiting lists should therefore be audited using guidelines developed by the British Cardiac Society and the American College of Cardiology and American Heart Association on the appropriate use of coronary revascularisation procedures, or by using the 'appropriateness criteria' developed by RAND for auditing the use of CABG in the UK [88].

8.4 Discussion

Guidelines for assessing urgency were developed by a group of UK clinicians based on a scoring system developed in Canada with the aim of maximising the benefits derived from surgery, thereby increasing efficiency. The ability of the scoring system to improve efficiency will depend on the validity of the assumptions upon which it is based.

The development of these guidelines should be considered as the first step to improving efficiency. Although the guidelines were based on others developed and validated elsewhere, they were modified by UK clinicians and their validity is therefore uncertain. Testing the guidelines prospectively in a number of providers is therefore needed. Furthermore, the economic consequences of introducing such guidelines should be evaluated. Guideline development, implementation and dissemination has associated costs and should only be implemented if the benefits of improved efficiency outweigh these costs.

There are, however, good arguments for purchasers and providers to adopt guidelines which aim to allocate surgery on the basis of urgency of need. Delaying surgery may cause patients to destabilise on the waiting list causing them to be admitted as an emergency hospital admission. This could displace other patients on the waiting list, increasing operative risk and thereby reducing the capacity to benefit. Of course mortality is not the primary reason for prioritising patients as deaths on waiting lists are rare. The main reason is to increase patients' quality of life (shortening patients'

duration of symptoms) and to reduce the economic and psychosocial burdens associated with waiting. For many patients and for society, long waits are not an ideal rationing mechanism because the total benefits gained from the intervention are less when long waits are involved. Since revascularisation procedures are typically done on relatively old people, the number of years over which benefits can be enjoyed is reduced by waiting for treatment.

Pressure is on both purchasers and providers to manage demand for coronary revascularisation services more efficiency and fairly, especially as ever shorter waiting time targets are included in the Patient's Charter. Purchasers could require, through contracts, that providers treat patients in accordance with a particular waiting time based on their urgency score. This would assure providers that purchasers are committed to buying an appropriate waiting time for all their patients rather than supply a specified block of procedures. It would also put providers in a better position to meet the targets set out in the Patient's Charter. Furthermore, if scores were monitored consistently in all hospitals, purchasers could identify areas of inequality of access which could then be addressed by a redistribution of resources or a reallocation of patients to other providers.

8.5 Summary

One strategy for improving efficiency through the contracting process is through the better management of patients on coronary revascularisation waiting lists. This Chapter has outlined the development of a set of urgency guidelines which aims to prioritise patients according to their urgency of need. The crucial assumption that underpins the development of the scoring system is that their use will reduce preoperative and postoperative mortality and morbidity, thereby improving efficiency in the use of coronary revascularisation services. The future research agenda required to test this assumption has been outlined.

CHAPTER 9

CONCLUSION

9.1 Introduction

This Chapter will (1) review the objectives of this thesis, summarise the findings and discuss any methodological limitations, (2) outline the implications of these findings for health care policy and (3) suggest an agenda for future research.

9.2 Review of main findings

The aim of the thesis was to assess the impact of the 1991 health care reforms on the British National Health Service with respect to one specialist service, coronary revascularisation, using an economic framework and to examine ways in which greater improvements in social welfare could be achieved.

The first objective was to describe the 1991 reforms of the NHS. The main concept behind the reforms was the creation of a competitive market within the framework of public provision and finance brought about by the separation of responsibility for funding and providing health services. The idea was that a competitive market would be created on the supply side and that competition would take place between existing hospitals (providers of health care) for contracts offered by DHAs and GPFHs (purchasers of health care). The introduction of market mechanisms occurred in stages alongside other policy changes which aimed to shift some resources to primary care services and to give patients more rights regarding the quality of the health care they received.

The second objective was to select relevant economic criteria for assessing the impact of the reforms on social welfare. The assessment criteria used in this thesis were taken from the branch of economics known as welfare economics which considers social welfare as having two dimensions, those of economic efficiency and distributional justice (equity). These two criteria involve predicting or analysing how changes in resource allocation brought about by government policy affects social welfare. Predominantly, the thesis was concerned with efficiency, both productive and allocative. Equity, in terms of equal access for equal need, was used to describe the distributional aspects of the reforms.

The third objective was to apply these criteria to coronary revascularisation services in a large representative sample of the UK. In order to assess whether the change in resource allocations brought about by the introduction of market mechanisms had been instrumental in improving efficiency the patterns and trends in the availability, utilisation and cost of coronary revascularisation services were reviewed. In summary, there were no significant changes in the availability of revascularisation services between 1991 and 1994 in terms of consultant cardiac surgical and cardiology staff. In contrast, the number of non-consultant cardiac surgical staff increased while the number of cardiac surgical beds fell in two Regions and increased in two. Wide inter-regional differences were found which either decreased or stayed the same over time indicating some improvement in allocative efficiency.

The NHS utilisation rate for CABG and PTCA increased between 1987 and 1994 but at a decreasing rate. There was also an increase in private provision, an increase in

the age of patients and a decrease in the ratio of males to females undergoing the operation. Wide inter-regional and inter-district variations were found which were mainly due to differences in supply. These variations decreased over time indicating a move towards greater allocative efficiency and equality of access. There was little change in the price of these procedures over time. Prices were unlikely to represent true costs and thus efficiency, despite government regulations that prices should equate with average cost, because the costing methods differed across providers. These trends, therefore, may imply no change in productive efficiency, an improvement in real terms or an improvement in the costing methods. Prices were found to vary between providers, probably due to differences in costing methods rather than differences in productive efficiency.

A number of methodological limitations should be noted. First, detecting any measurable impact of the reforms was limited by the short period of time over which the trends in availability and utilisation of coronary revascularisation procedures could be assessed. Second, attributing the trends found to the reforms is complicated by the effects of concurrent policy changes and the diffusion process of new technologies. Other policy changes, which may have made some contribution to the trends found, included 'The Health of the Nation' [11], the Tomlinson Report [12] and the Patient's Charter [13]. Also, as PTCA was a relatively new technology and the provision of CABG was still expanding, large variations in the rate of use of these procedures were expected. A further reduction in variation may be expected over the coming years simply as a consequence of increasing the availability of revascularisation services. Third, as no account had been taken of the variations in the need for coronary

revascularisation services, the severity of cases, the quality of service, or costs, it was difficult to attribute the decrease in variations in availability and use of coronary revascularisation services to improvements in allocative efficiency. Fourth, the use of total bed numbers and WTE staffing levels as indicators of resource availability may have led to misleading results for a number of reasons: Coronary revascularisation beds were difficult to separate out from the bed allocations of other specialties; cardiologists were only included if their main base was at the specialist centre which may have led to an underestimation of the number of cardiologists; and defining the number of staff by the use of WTEs made it difficult to distinguish an actual rise in resource availability from a reduction in the number of working hours.

The fourth objective was to assess how the contracting process had influenced these observed changes. The contracting process developed over the first four years and purchasing skills became more sophisticated. However, given the considerable problems faced by both purchasers and providers and the administrative costs associated with purchasing it is likely that, if anything, the contracting process has had a negative impact on social welfare.

Purchasers were concerned about the increase in demand for CABG and PTCA, in part brought about by initiatives set up by providers, which put an ever increasing burden on their limited budget. More efficient use of resources was made difficult by purchasers' inability to make meaningful comparisons between the quality and cost of providers' services due to the paucity of accurate and comparable information.

Providers' concerns seem to have become more acute since the introduction of market mechanisms. In the first year of the reforms their main concern was how to deal with the contracting process. By the third year, providers were more concerned about the future. Some providers experienced an increase in demand for their services with no associated increase in the resources available. This problem was exacerbated in some districts by the effects of the new resource allocation formula. Although some providers attempted to secure longer term contracts to create greater stability and thus enable service developments to be carried out, purchasers were reluctant to commit themselves for longer than 12 months. Providers felt they were also subject to unfair competition in the market place and an inability to maintain clinical need as the basis of selecting patients.

It is possible that these views of the reforms were not representative and that the problems which have occurred as a result of the introduction of the contracting system have either been overstated or understated. However, a representative from each of the ten NHS providers in the four regions studied were interviewed in each of the three years (1992-1994). Purchasers in each region were also interviewed on a sample basis in each of the three years. They were selected with the advice of local NHS staff as being particularly interested and active in contracting for these services. As the four regions studied were selected to ensure representation of different historical levels of provision, population density, geographical location and initial approaches to purchasing, it is probable that the views obtained were representative. The analysis was qualitative in that the aim was to determine the views that existed not to count their frequency.

The fifth objective was to determine whether and how the management of demand for coronary revascularisation services could be improved. The quantitative and qualitative analyses had demonstrated the changes which had occurred since the introduction of market mechanisms into the NHS in 1991. The decrease in variations in the availability and use of coronary revascularisation services and the increase in the sophistication of contracting suggest the reforms have increased efficiency, both productive and allocative, and equity within the NHS. However, the large variations that remain and the contracting problems which prevail signify that the introduction of market mechanisms into the NHS is a long way off achieving an efficient allocation of resources.

There are a number of reasons why market mechanisms failed in the first three years to reallocate health care resources in a way that significantly improved social welfare. The major obstacles seemed to be market failure and inappropriate regulation. A strategy for improving social welfare would involve managing the market for coronary revascularisations more effectively to overcome these market failures.

Most revascularisations are performed as elective rather than emergency procedures, therefore the management of demand for coronary revascularisation services takes place predominantly on waiting lists. More effective management of waiting lists could potentially lead to improved efficiency by ensuring the right patients were getting treated at the right time. An audit of waiting list management in three hospitals demonstrated that patients were often not treated within the appropriate time, as defined by a Canadian Urgency Score, indicating that they were not prioritised

accurately according to their clinical need. The potential to improve efficiency by more effective management of coronary revascularisation waiting lists therefore existed.

It could be argued that the management of waiting lists in each of the three hospitals studied was not representative of all cardiac centres in the UK. However, most cardiac centres have there own informal guidelines, which generally consist of three categories (urgent, soon, routine). A similar proportion of patients were delayed (treated later than their surgeons had planned) in the three hospitals (11%) as were delayed in a larger sample of ten NHS hospitals studied in 1992/93 (8%). This suggests that all hospitals find managing demand for coronary revascularisation services equally difficult and that the three hospitals chosen for this study were not atypical.

9.3 Implications for Health Care Policy

The sixth objective was to make recommendations to improve social welfare. Market failure and inappropriate regulation have prevented market mechanisms from achieving an efficient allocation of resources. Greater social welfare could potentially be achieved by more effective management of the market and more appropriate regulation by the government. General recommendations for managing health care markets more effectively and for improving the appropriateness of government regulation have been outlined elsewhere [40,43].

In relation to coronary revascularisation services a number of suggestions and recommendations can be made with the aim of improving social welfare:

9.3.1 Improving social welfare

Health care markets will improve efficiency if a number of conditions exist. First, purchasers must be able to make cost and quality comparisons between providers to ensure that they are operating efficiently. The theory is that those who are operating inefficiently will be forced out of the market. However, this thesis has shown that purchasers were unable to choose the most efficient provider because of their inability to make meaningful comparisons between providers due to the paucity of accurate and comparable information. There are a number of ways to improve information on cost. The development of a system for coding and pricing groups of treatments (Healthcare Resource Groups) will allow more accurate understanding of providers' costs, furthermore if purchasers request providers to supply information on pricing strategies it will become more apparent if prices differ between providers because of differences in efficiency.

In addition to improving knowledge on the comparative costs of coronary revascularisation services purchasers should assess the quality of care and request providers to supply information on certain accepted measures, for example, risk-adjusted mortality. Most providers have started to collect data on the outcomes of care. The British Society of Cardiothoracic Surgeons has recommended the use of a clinical database (Patient Analysis and Tracking System) which has the capacity of

generating risk-adjusted outcomes and a national database is currently being piloted for both CABG and PTCA. Purchasers should ensure that their main providers are using a similar approach to measuring outcomes so that they can be compared between providers and that newly acquired clinical databases are compatible with those recommended by the Society.

Second, by separating purchasing from provision and by allowing GPs to hold budgets, the reforms created a purchasing function that encouraged concentration on the health needs of the population. Efficiency would be improved if purchasers were successful in avoiding health care which is inappropriate rather than avoiding health care which is expensive. Few purchasers were able to assess the level of need in the population or the appropriateness of referrals for these procedures due to lack of information. Purchasers should start to move away from purchasing these services on the basis of historical levels of activity and use proxy measures of need (for example, standardised mortality ratios) to determine how many procedures to purchase. It is recommended that purchasers monitor the appropriateness of referrals and encourage their main providers to achieve a professional consensus on referral guidelines.

Revascularisation should be restricted to those patients most likely to benefit. The development of clinical guidelines, which are informed by the results of RCTs, may help to ensure that those patients who can benefit most from revascularisation services are given priority and that treatment is received within an appropriate time period. However, given that the purchasers' budgets are limited, they should assess the relative benefits of revascularisation services compared to other health services in order to

maximise the health benefits from the resources available.

9.3.2 Prioritisation of waiting list patients

This thesis focused on one method of improving social welfare. It was demonstrated that the right patients were not always being treated at the right time. This may have been the result of a number of factors including inappropriate informal prioritisation systems or the adverse effects of the contracting process. *It was recommended that the management of demand be improved by the development of guidelines aimed at prioritising patients awaiting coronary revascularisation services.* The guidelines developed for the purposes of this study were based on the Canadian guidelines and adapted by local clinicians, they were therefore open to varying opinions and required validation. However, *it is recommended that rather than wait until the guidelines have been validated, they should be implemented and their effect on short-term mortality and morbidity reviewed. Data on each patient allocated surgery on the basis of the guidelines should be collected and the progress of the guidelines monitored.* One hospital has already taken up the use of these guidelines for managing coronary revascularisation patients.

9.4 Future research agenda

The final objective was to suggest a future research agenda consequent on the results of this thesis. A number of suggestions, relating to the development of urgency

guidelines, have already been discussed in Chapter 8 and will not be repeated here.

This thesis has made recommendations for managing the market for coronary revascularisation services more efficiently. It addressed, in detail, one area where efficiency could be improved. There are a number of other strategies for improving efficiency not addressed in this thesis. For example, an audit of the production processes and costs of coronary revascularisation services may reveal areas where productive efficiency could be improved. This thesis also did not address issues regarding the humanity of care. The urgency guidelines studied included only clinical factors and no social factors such as the influence of work status. It is therefore recommended that a prospective study considers the influence social factors should have on how long patients wait for treatment.

This study has outlined the difficulties of analysing the effects of the reforms on social welfare in the short-term. It is recommended that the monitoring of these trends is continued over the long-term. It is unclear over what time period the reforms should be monitored given that the nature of the market is continually evolving. However, given that most of the structural developments of the health care market have already taken place and that the resource allocation formula has been introduced into all Regions, monitoring these trends for another three to four years should be sufficient.

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APPENDICES

APPENDIX I

LOCATION OF NHS AND PRIVATE PROVIDERS IN EACH STUDY REGION

Figure Ia: NHS and private provider units for residents of East Anglian region

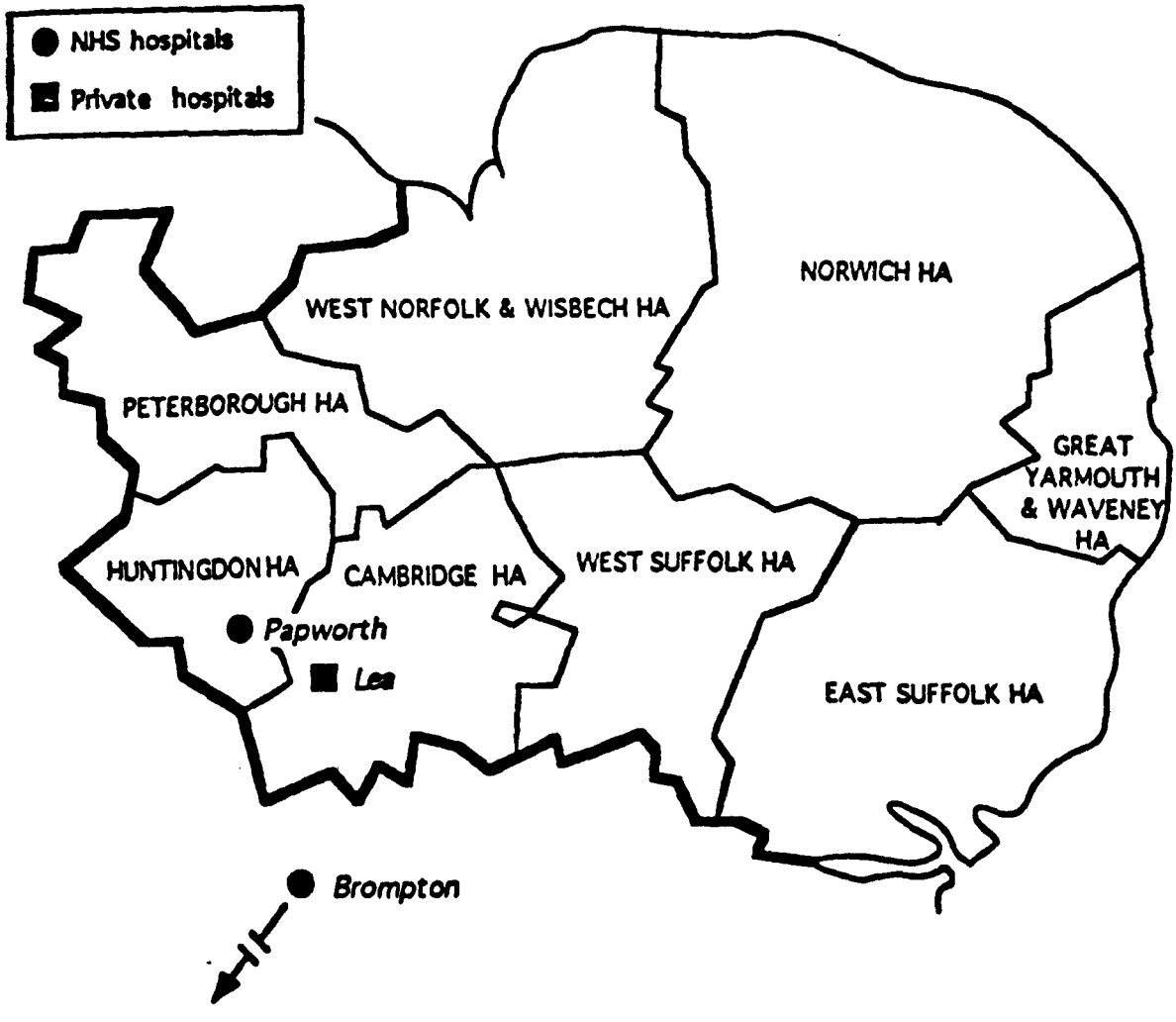


Figure Ib: NHS and private provider units for residents of North Western region

Figure Ic: NHS and private provider units for residents of South East Thames region

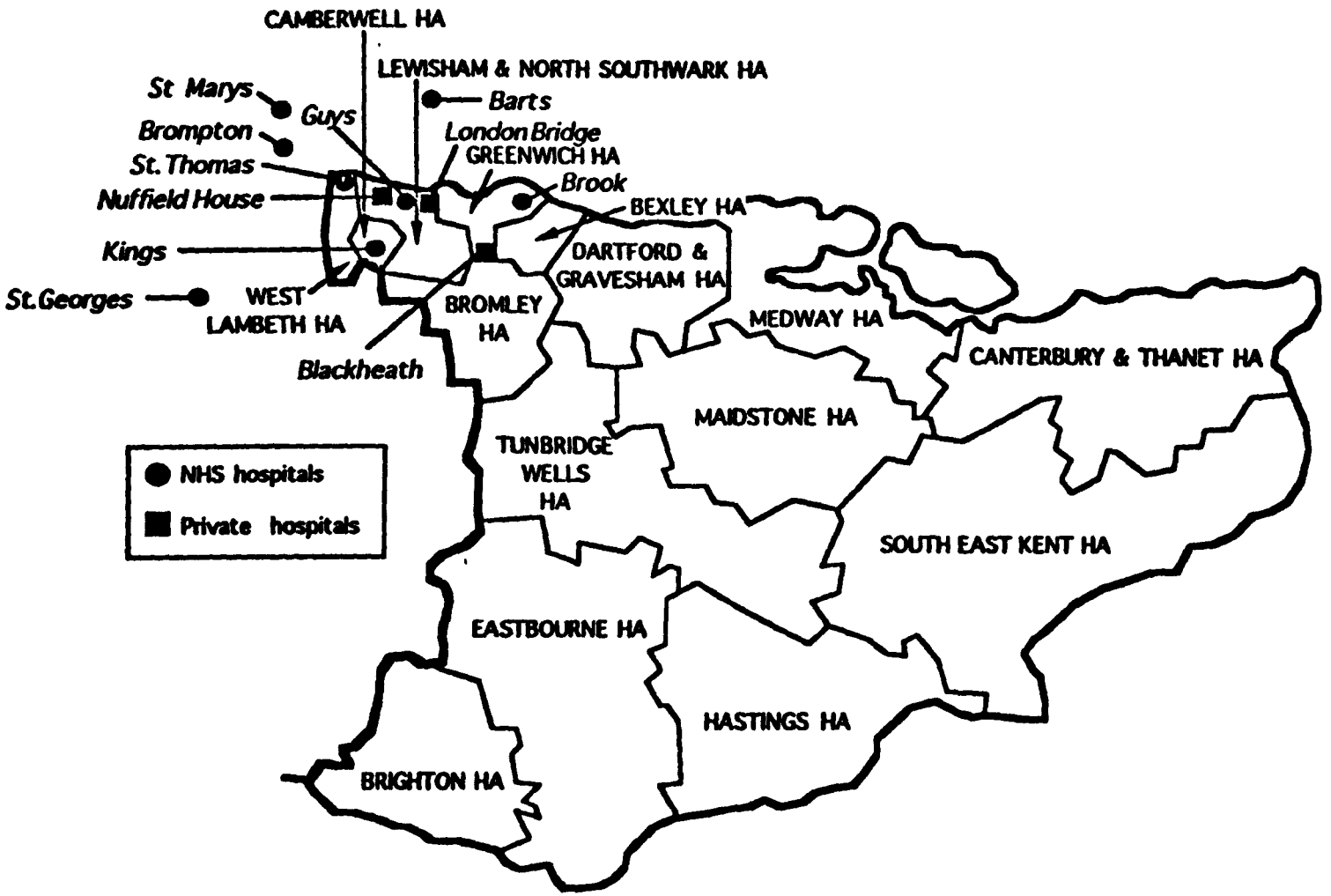
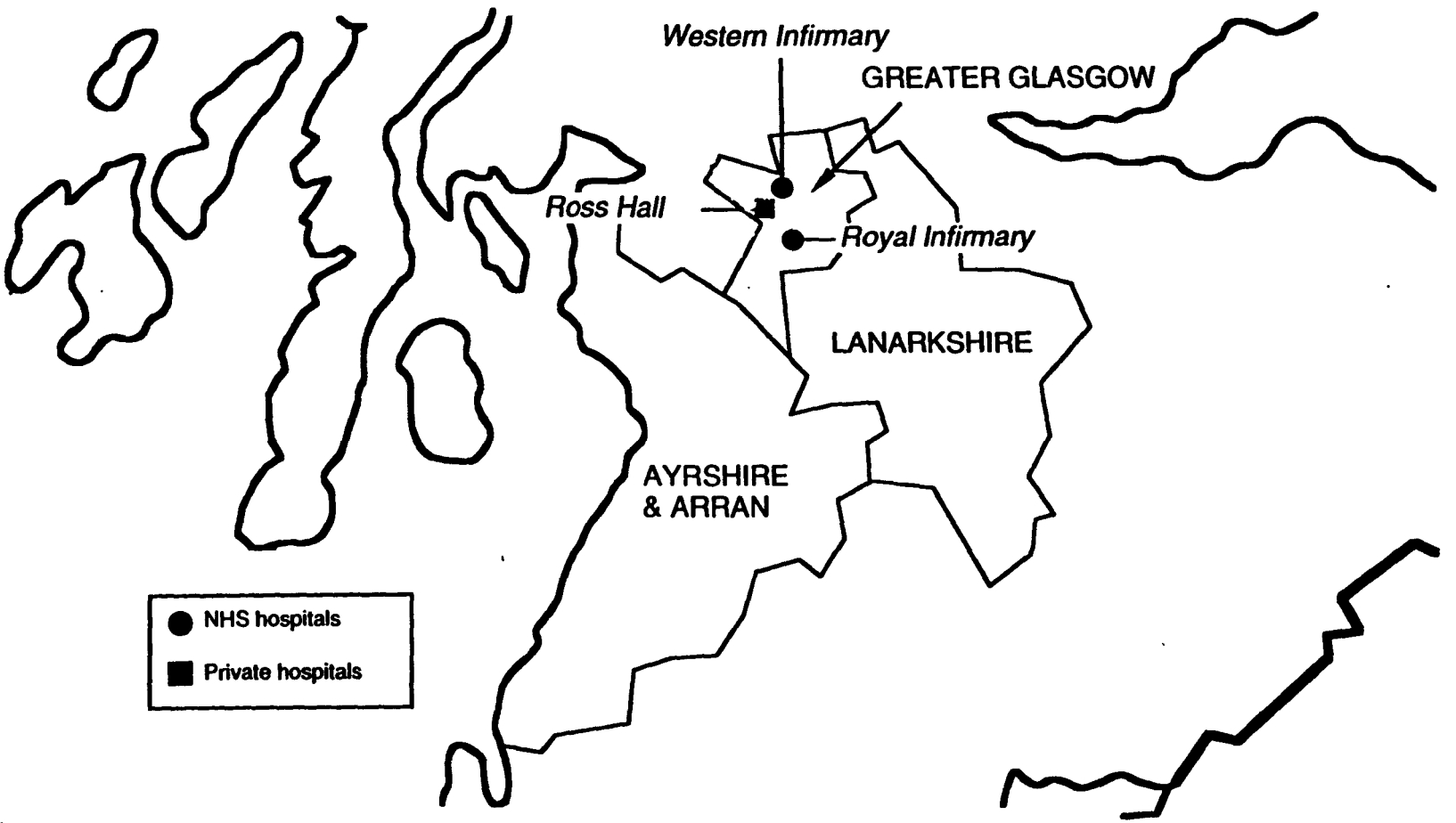


Figure Id: NHS and private provider units for residents of Greater Glasgow 'region'.



APPENDIX II

AGE-SEX STANDARDISED RATES : INTRAREGIONAL NHS CASES

Table IIa: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of E. Anglian region: intraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Cambridge	239	349	377	507	628	12	101	158	205	285
Peterbro'	244	196	332	407	477	22	66	51	96	98
W. Suffolk	240	352	488	491	554	7	83	123	148	252
E. Suffolk	124	155	281	371	458	11	97	87	143	251
Norwich	273	299	315	347	450	12	37	66	78	130
Yarmouth	130	182	192	212	282	8	56	40	64	104
W. Norfolk	146	226	239	207	274	14	22	78	36	63
Huntington	298	382	568	641	548	17	26	195	223	291
Region	213	261	330	377	456	12	76	92	116	178
No. per million total pop^{n}	138	172	221	253	306	8	50	62	78	119

Table IIb: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of N. Western region: intraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Lancaster	188	299	105	287	309	26	103	100	100	128
Blackpool	460	444	510	588	669	55	61	66	30	217
Preston	276	286	385	457	257	88	85	112	12	72
Blackburn	164	205	310	324	421	40	80	74	74	133
Burnley	220	314	381	425	411	20	59	58	38	58
West Lancashire	143	261	419	418	204	28	85	102	76	64
Chorley	201	330	243	256	261	16	53	66	66	43
Bolton	261	314	336	409	506	25	77	18	81	75
Bury	402	454	390	374	539	114	44	68	141	142
North Manchester	350	575	433	545	570	97	187	134	149	156
Central Manchester	951	1091	949	1077	931	225	482	280	469	184
South Manchester	445	584	772	537	718	91	157	130	130	299
Oldham	256	267	298	260	271	49	64	22	64	82
Rochdale	349	458	559	722	618	23	97	67	252	171
Salford	153	313	424	342	375	150	168	130	195	187
Stockport	409	482	575	433	455	118	66	125	134	148
Tameside	286	564	530	485	487	114	141	156	104	101
Trafford	306	288	542	440	448	116	117	181	142	165
Wigan	253	312	428	476	508	83	111	112	95	177
Region	315	402	461	471	493	76	106	99	115	144
No. per million total pop^{n}	205	261	304	311	325	49	69	65	76	95

Table IIc: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of S.E. Thames region: intraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Brighton	332	340	434	508	628	74	156	220	307	296
Eastbourne	149	218	249	345	465	37	95	263	303	297
Hastings	393	507	485	475	599	64	213	239	270	463
S.E. Kent	276	330	357	383	478	151	136	173	238	356
Canterbury/ Thanet	175	281	285	401	407	22	149	163	284	261
Dartford/ Gravesham	479	447	512	510	677	41	151	482	513	462
Maidstone	280	313	558	542	826	168	334	516	575	650
Medway	355	342	336	443	447	20	151	259	182	237
Tunbridge Wells	498	409	344	354	459	90	95	268	243	288
Bexley	542	668	775	674	881	62	687	854	1195	956
Greenwich	610	756	786	760	964	141	660	1109	1443	1467
Bromley	173	191	312	388	528	81	239	265	383	383
W. Lambeth	119	374	344	335	435	107	101	267	252	254
Camberwell	442	556	727	791	951	329	274	673	1096	1185
Lewisham NS	415	539	615	579	547	227	277	396	490	337
Region	339	392	448	475	589	102	235	377	476	477
No. per million total pop^n	224	263	300	318	395	67	157	253	319	320

Table IId: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of G. Glasgow region: intraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Greater Glasgow	526	541	855	879	799	188	226	316	301	240
Lanarkshire	377	360	475	513	650	75	162	186	203	222
Ayr/Arran	411	467	578	672	550	61	79	195	220	197
Region	461	475	687	730	704	130	177	252	256	225
No. per million total pop^n	295	309	453	482	465	83	115	166	169	149

APPENDIX III

AGE-SEX STANDARDISED RATES: INTRA AND EXTRAREGIONAL NHS CASES

Table IIIa: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of E. Anglian region: intra and extraregional NHS cases.**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Cambridge	239	349	382	515	633	12	101	158	205	285
Peterbro'	244	196	346	407	477	22	66	51	96	98
W. Suffolk	240	352	495	505	561	14	83	123	155	259
E. Suffolk	124	159	294	394	462	11	97	87	152	260
Norwich	273	304	321	355	450	12	37	66	81	139
Yarmouth	130	182	192	212	294	8	56	40	70	104
W. Norfolk	146	226	239	221	274	14	22	78	36	63
Huntington	298	382	568	641	548	17	261	195	223	294
Region	213	261	332	387	459	13	76	92	120	183
No. per million total pop^n	138	172	222	259	308	8	50	62	80	123

Table IIIb: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of N. Western region: intra and extraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Lancaster	188	310	105	287	309	26	103	100	100	128
Blackpool	460	444	513	592	669	55	61	71	30	217
Preston	278	286	397	457	257	88	85	112	12	72
Blackburn	164	205	316	324	421	40	80	74	85	133
Burnley	220	399	446	458	450	26	59	78	38	58
West Lancashire	257	318	535	504	424	71	155	141	142	131
Chorley	201	339	251	256	261	16	53	66	73	43
Bolton	261	314	336	409	512	25	77	18	68	76
Bury	402	463	390	382	539	128	44	78	141	142
North Manchester	350	575	433	557	570	97	187	134	160	144
Central Manchester	951	1091	949	1077	931	239	482	296	469	184
South Manchester	445	584	782	537	727	91	138	130	130	299
Oldham	256	267	305	260	279	49	64	22	64	82
Rochdale	364	480	567	722	618	23	97	67	252	171
Salford	153	313	437	342	375	150	168	130	195	187
Stockport	409	476	575	427	455	118	66	125	134	148
Tameside	286	564	530	485	487	114	141	156	110	101
Trafford	313	288	542	440	448	116	117	181	142	172
Wigan	259	312	450	493	521	83	111	117	102	183
Region	319	411	483	478	504	78	107	102	119	146
No. per million total pop^n	207	267	312	315	333	51	70	67	79	96

Table IIIc: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of S.E. Thames region: intra and extraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Brighton	332	349	459	518	628	74	161	234	307	301
Eastbourne	149	237	271	428	475	33	101	283	323	320
Hastings	393	540	503	495	608	81	249	248	270	463
S.E. Kent	281	341	373	404	494	151	136	173	238	361
Canterbury/ Thanet	175	292	299	362	411	26	154	173	299	261
Dartford/ Gravesham	485	509	527	531	683	41	152	489	513	475
Maidstone	287	328	595	556	849	183	350	540	617	657
Medway	360	346	347	476	456	20	151	263	195	251
Tunbridge Wells	498	431	366	376	481	97	95	275	257	325
Bexley	555	727	825	709	888	62	694	862	1195	998
Greenwich	610	763	802	760	1012	141	668	1117	1450	1475
Bromley	187	339	495	537	801	96	263	303	412	456
W. Lambeth	137	731	830	996	544	119	222	543	378	351
Camberwell	450	604	779	867	1029	346	292	698	1111	1226
Lewisham NS	425	573	641	635	557	227	281	423	496	342
Region	344	439	503	540	631	107	248	401	490	499
No. per million total pop^{n}	227	294	337	362	423	71	166	269	328	334

Table IIId: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of G. Glasgow region: intra and extraregional NHS cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Greater Glasgow	526	541	857	882	799	188	226	316	306	240
Lanarkshire	377	360	475	513	650	75	162	186	203	222
Ayr/Arran	411	467	578	672	550	61	79	195	220	197
Region	461	475	687	734	704	130	177	253	258	225
No. per million total pop^n	295	309	453	484	465	83	115	167	170	149

APPENDIX IV

AGE-SEX STANDARDISED RATES: PRIVATE CASES

Table IVa: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of E. Anglian region: private cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Cambridge	24	65	97	120	62	12	33	51	78	125
Peterbro'	7	58	89	102	75	0	0	0	50	22
W. Suffolk	42	82	101	50	101	0	0	13	41	52
E. Suffolk	14	60	71	140	101	0	10	14	56	63
Norwich	26	38	66	74	75	0	9	14	8	31
Yarmouth	14	21	55	20	38	0	21	0	0	7
W. Norfolk	7	33	36	49	28	0	0	0	0	29
Huntington	0	92	118	69	142	0	13	75	0	77
Region	19	52	75	81	75	2	11	18	30	49
No. per million total pop^{n}	12	34	50	54	50	1	7	12	20	33

Table IVb: Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of N. Western region: private cases

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Lancaster	11	21	22	53	80	0	23	11	0	34
Blackpool	13	17	86	55	47	0	0	0	16	22
Preston	24	24	24	24	84	25	12	0	0	0
Blackburn	40	17	74	23	70	17	40	29	23	17
Burnley	27	33	84	46	62	0	0	0	12	19
West Lancashire	28	41	40	68	203	0	13	0	37	40
Chorley	16	52	98	28	67	15	8	7	16	15
Bolton	36	47	64	92	53	19	6	30	48	16
Bury	132	103	126	192	163	0	18	42	68	87
North Manchester	55	11	35	84	46	0	11	0	0	0
Central Manchester	0	14	31	57	30	0	0	14	14	16
South Manchester	123	118	63	55	129	9	18	0	46	9
Oldham	48	22	64	58	128	0	14	21	0	22
Rochdale	74	51	84	109	111	0	7	0	59	37
Salford	31	39	90	71	65	0	13	20	20	6
Stockport	138	131	119	137	217	10	35	48	75	65
Tameside	25	41	90	91	80	12	0	5	17	34
Trafford	103	90	128	134	168	42	48	67	82	20
Wigan	31	34	61	85	90	10	20	10	30	5
Region	52	50	81	83	102	9	16	19	33	26
No. per million total pop^n	34	33	53	55	67	6	10	13	22	17

Table IVc: Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of G. Glasgow region: private cases

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Greater Glasgow	19	65	55	183	117	0	8	45	25	2
Lanarkshire	0	0	0	0	47	0	0	0	0	0
Ayr/Arran	0	20	0	0	45	0	0	0	0	0
Region	10	37	27	90	81	0	3	22	12	1
No. per million total pop^{n}	6	24	18	59	53	0	2	15	8	1

APPENDIX V

AGE-SEX STANDARDISED RATES: NHS AND PRIVATE CASES

Table Va: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of E. Anglian region: NHS and private cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Cambridge	263	415	479	632	695	23	135	209	283	410
Peterbro'	251	261	436	509	552	22	66	51	146	120
W. Suffolk	283	435	595	554	662	14	83	135	197	310
E. Suffolk	138	219	365	533	564	11	107	101	208	323
Norwich	300	343	387	430	525	12	46	80	89	170
Yarmouth	144	203	247	232	333	8	77	40	70	111
W. Norfolk	154	259	275	271	302	14	22	78	36	92
Huntington	298	489	686	710	689	17	27	270	223	371
Region	232	313	407	468	534	15	87	110	150	232
No. per million total pop^n	150	207	273	314	358	10	57	74	101	155

Table Vb: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of N. Western region: NHS and private cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Lancaster	198	331	128	340	389	26	125	111	100	161
Blackpool	472	461	600	647	715	55	61	71	46	239
Preston	299	322	421	481	340	113	96	112	12	72
Blackburn	204	222	391	348	491	58	119	103	108	150
Burnley	247	432	530	504	512	26	60	78	50	77
West Lancashire	302	359	575	572	628	71	168	141	204	171
Chorley	216	391	350	284	327	30	61	72	90	58
Bolton	297	362	400	502	565	43	83	47	126	92
Bury	534	566	516	574	702	128	62	120	203	229
North Manchester	406	585	469	641	616	97	198	134	161	156
Central Manchester	951	1105	980	1134	962	239	482	310	445	200
South Manchester	568	702	845	593	856	100	156	130	153	307
Oldham	304	289	368	317	407	49	79	43	62	103
Rochdale	438	531	651	831	730	23	104	67	302	208
Salford	184	352	528	413	440	150	180	150	214	193
Stockport	547	608	694	570	671	128	101	173	208	213
Tameside	311	604	619	576	567	126	141	161	127	135
Trafford	416	378	670	574	616	158	165	247	222	192
Wigan	284	346	511	578	611	93	131	126	133	188
Region	371	461	554	561	606	87	123	121	152	172
No. per million total pop^n	241	300	366	370	400	57	80	80	100	114

Table Vc: **Age-sex standardised rates (per million aged >24 years) of CABG and PTCA in districts of G. Glasgow region: NHS and private cases**

District	CABG					PTCA				
	87/88	89/90	91/92	92/93	93/94	87/88	89/90	91/92	92/93	93/94
Greater Glasgow	546	606	912	1065	918	188	235	361	331	242
Lanarkshire	377	360	475	513	697	75	162	186	203	222
Ayr/Arran	411	467	578	672	595	61	79	195	220	197
Region	471	507	713	822	785	130	181	275	271	226
No. per million total pop^{n}	301	330	471	543	518	83	118	182	179	149

APPENDIX VI

DATA FOR FIGURE 7.3

Urgency Score	Concordant No.	Concordant %	Delayed No.	Delayed %	Accelerated No.	Accelerated %	Total
1-1.9	4	44.4	5	55.6	NA	NA	9
2-2.9	50	21.6	182	78.4	NA	NA	232
3-3.9	3	4.8	46	74.2	13	21.0	62
4-4.9	21	26.9	44	56.4	13	16.7	78
5-5.9	56	28.3	66	33.3	76	38.4	198
6-6.5	289	43.6	81	12.2	293	44.2	663
> 6.51	158	57.0	NA	NA	119	43.0	277
Total	**581**	**38.2**	**424**	**28.0**	**514**	**33.8**	**1519**

APPENDIX VII

FIGURES AND DATA FOR INTER-HOSPITAL COMPARISON

Figure VIIa: Concordance of patient's actual waiting time with the appropriate waiting time, as defined by the Urgency Score. Hospital 1

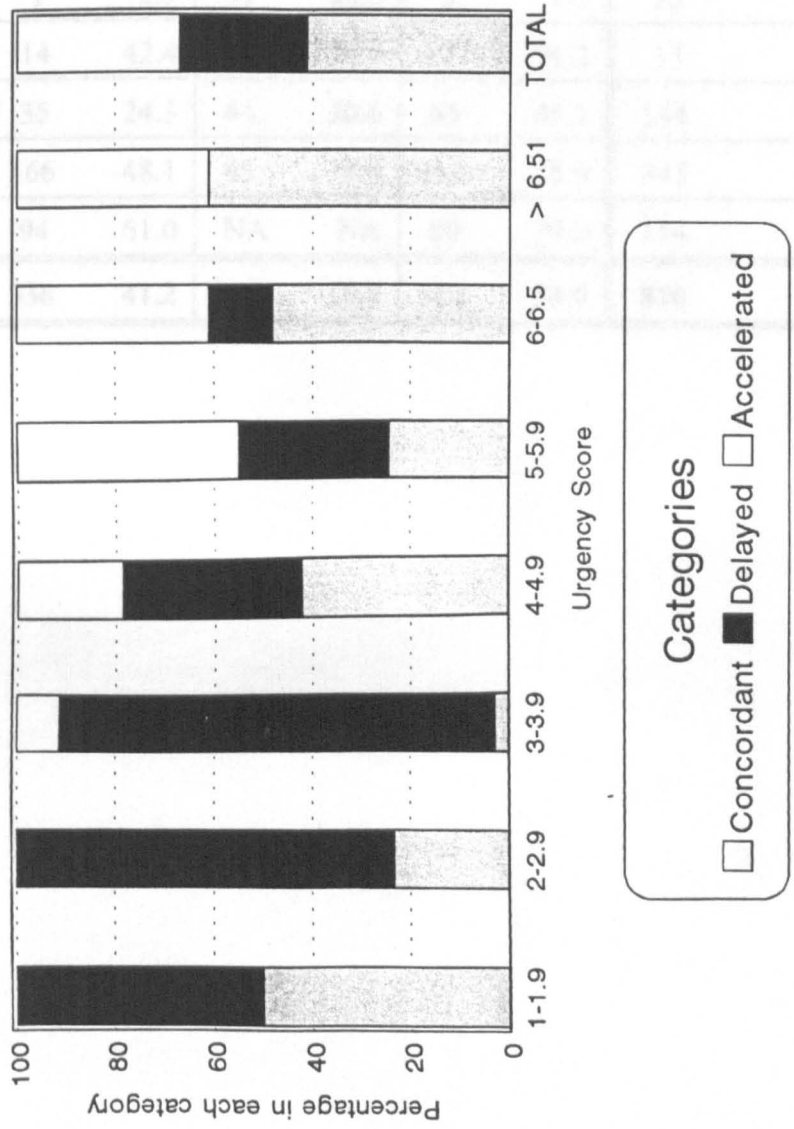


Table VIIa: Data for Figure VIIa

Urgency Score	Concordant No.	%	Delayed No.	%	Accelerated No.	%	Total
1-1.9	3	50.0	3	50.0	NA	NA	6
2-2.9	23	23.2	76	76.8	NA	NA	99
3-3.9	1	2.9	31	88.6	3	8.5	35
4-4.9	14	42.4	12	36.4	7	21.2	33
5-5.9	35	24.3	44	30.6	65	45.1	144
6-6.5	166	48.1	45	13.0	134	38.9	345
> 6.51	94	61.0	NA	NA	60	39.0	154
Total	**336**	**41.2**	**211**	**25.8**	**514**	**33.0**	**816**

Figure VIIb: Concordance of patient's actual waiting time with the appropriate waiting time, as defined by the Urgency Score.
Hospital 2

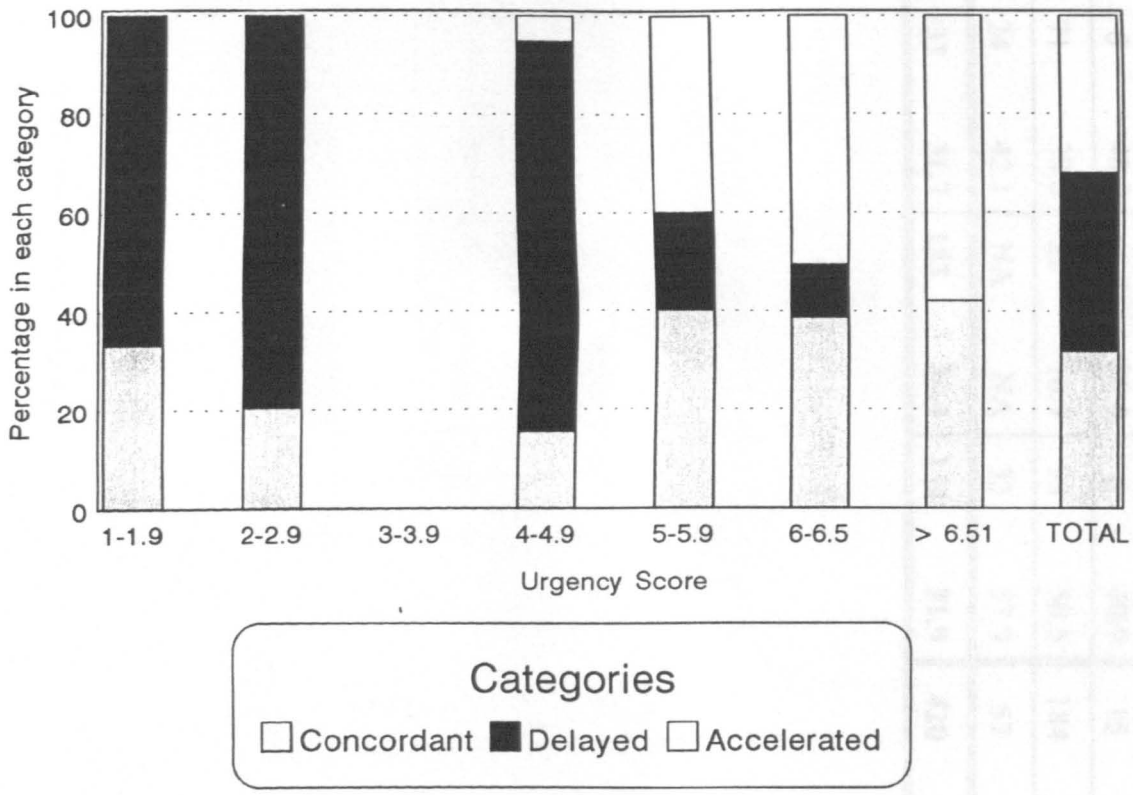
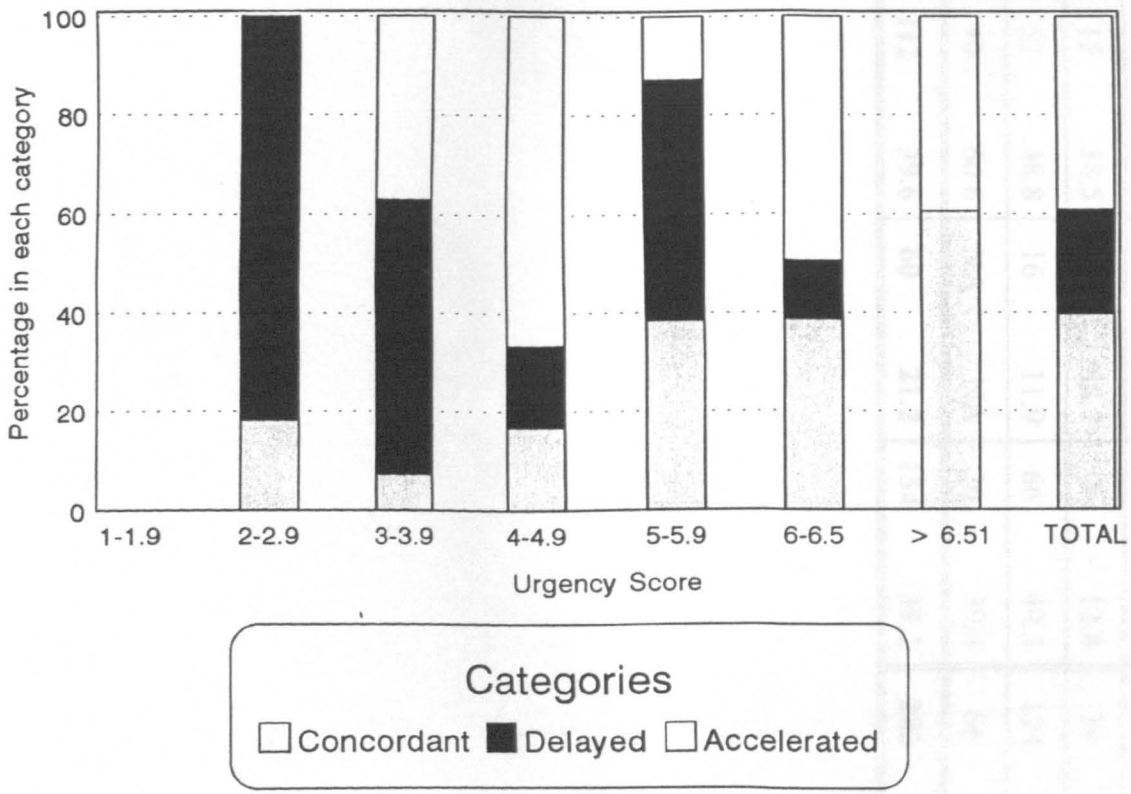


Table VIIb: Data for Figure VIIb

Urgency Score	Concordant No.	%	Delayed No.	%	Accelerated No.	%	Total
1-1.9	1	33.3	2	66.7	NA	NA	3
2-2.9	25	20.5	97	79.5	NA	NA	122
3-3.9	0	0.0	0	0.0	0	0.0	0
4-4.9	9	15.4	31	79.5	2	5.1	39
5-5.9	6	40.0	3	20.0	6	40.0	15
6-6.5	71	38.6	20	10.9	93	50.5	184
> 6.51	24	42.1	NA	NA	33	57.9	57
Total	**133**	**31.7**	**153**	**36.4**	**134**	**31.9**	**420**

Figure VIIc: Concordance of patient's actual waiting time with the appropriate waiting time, as defined by the Urgency Score.
Hospital 3



The Evolution of a Public Sector Market for Cardiac Services in the UK: 1991–1994

Sue Langham and Nick Black

The introduction of a market economy into the National Health Service caused concern about the future of specialist services. This article describes the impact of the reforms over time on two specialist services, focusing on the evolution of the contracting system, the nature of the market and the problems experienced by purchasers and providers. The article concludes that providers' concerns about the future of their specialist services have become more acute since the introduction of the market economy. Control over their future lies in the hands of purchasers and the Government.

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Reform of the British National Health Service (NHS) in 1991 introduced competitive markets into the health care system. This sparked off fears among some health care professionals about the ability of market forces to preserve and develop highly specialized services. They feared that the future of these high-cost services, which were provided in only a small number of hospitals, would be put in jeopardy. It was argued that the success of the reforms and the survival of specialist health care services depended on striking the right balance between regulating the market and fostering competition (Donaldson, 1992). Health care professionals believed that specialist services would require careful regulation if equality of availability and access were to be achieved and that the service, if left to market forces, would become fragmented and ineffective (House of Commons, 1992).

Predictions as to the effects of introducing markets into specialist health care have varied widely. Some observers were cautiously optimistic that certain aspects of the reforms would enhance efficiency and equity given the right balance between competition and regulation (King's Fund Institute, 1989; Culyer, 1990, 1991; Roberts, 1993; Best *et al.*, 1994; Ham and Maynard, 1994;). Others have contradicted this view, stressing that a health service which combined characteristics of a market with those of central regulation risked getting the worst of both worlds (Hughes and Dingwall, 1991; Boyle and Darkins, 1994). Yet others have highlighted the fact that the characteristics required for a competitive market were not likely to found in health care, and that therefore the benefits of increased efficiency brought about by a market-based system would not accrue (Donaldson and Mooney, 1993; Brazier and Normand, 1991; Propper, 1992; Roberts, 1993).

The reason for such diverse opinions has partly been a lack of empirical evidence. Results of studies evaluating the reforms started to emerge only two years after the inception of the changes and, inevitably, many reported little actual change (Robinson and Le Grand, 1993). Other studies reviewed the changes taking place within the NHS as a result of the new contracting system (NHSME, 1994). One such study was that undertaken by the Clinical Standards Advisory Group (CSAG), a body set up by the Government in 1991 to act as an independent source of expert advice to UK health ministers. One of the CSAG's responsibilities was to monitor access to and the availability of selected specialist services and describe the effects the NHS reforms were having. Their first set of reports were published in 1993 (CSAG, 1993 a–e). The Government's response to these reports was that there was no evidence that services had suffered following the changes (DoH, 1993). As the reports only covered the first 12 to 18 months of the new funding arrangements, it could be argued that it was too soon for the reforms to have had any detectable impact.

Studying the effect of the reforms has been complicated by several concurrent policy changes, including:

- The Government's White Paper *The Health of the Nation*, which set specific targets for the reduction of coronary heart disease mortality, (Secretary of State, 1992).
- The incorporation of a maximum in-patient waiting time of 12 months for coronary artery bypass grafting (CABG) in the *Patient's Charter* (Department of Health, 1994).
- The introduction of a new weighted capitation formula for distributing funds to health regions (Secretaries of State, 1989a and b).
- The Tomlinson inquiry and similar undertakings

in other major cities set up to recommend major changes in the configurations of health services (Tomlinson Inquiry, 1992).

Recent managerial and organizational changes, which may have some influence on the management and functioning of specialist services, include merging of family health service authorities (FHSAs) and district health authorities (DHAs), major changes to regional health authorities (RHAs) and changes to the funding and nature of general practitioner (GP) fundholding.

Despite the methodological difficulties such concurrent interventions present, it is important the impact of the 1991 reforms is understood. This article describes the views of purchasers and providers of two specialist services—CABG and percutaneous transluminal coronary angioplasty (PTCA)—over the first three years of the reforms. First the evolution of contracting is described; second, the nature of the market is assessed, and, finally, the problems faced in the first year are compared with experiences in the third year.

Methods

A series of semi-structured interviews were carried out during July and August 1992, 1993 and 1994 with a sample of purchasing agencies and providers of CABG and PTCA in four areas of the UK. These were South East Thames Region, North Western Region, East Anglian Region and Greater Glasgow, including Lanarkshire and Arran/Ayrshire. The areas were selected to provide a representative sample with reference to historical levels of provision, population density, geographical location and initial approaches to purchasing.

The business managers responsible for cardiology and cardiothoracic contracts in all ten NHS providers in the four areas were interviewed in each of the three years. Thirteen purchasers were selected, after advice from local NHS staff, as being particularly interested and active in contracting for these services. They included RHA and DHA staff and, in 1994, GP fundholders. The interviews were concerned with the respondents' experiences of commissioning these two specialist services. The interviews lasted approximately one hour and information was recorded by either making notes during and after the interviews or by audio-taping. The data obtained were categorized according to the five principal issues which emerged. For purchasers the categories were: responsibility for purchasing; types of contracts used; methods used to agree, place and monitor contracts; type of relationship with the main provider; and problems that had occurred. For providers the categories were: types of contracts used; methods used to price procedures; relationship with the main purchaser; issues regarding the type of competition; and problems that had occurred.

Results

Evolution of Contracting

When the reforms were introduced in 1991, three areas (including one in which commissioning did not start until April 1992) maintained the *status quo* as regards responsibility for purchasing the services (see table 1). Contracts were paid for centrally (by the RHAs in the three English regions studied) by either top-slicing funds from district allocations or charging the district according to their level of use. The fourth area devolved the responsibility of purchasing to district purchasing consortia from the outset. After the initial maintenance of a steady state, the other regions also began to relinquish their control over the market and devolve the responsibility of contracting to either district purchasing consortia or individual districts. At the same time, the proportion of the population served by fund-holding general practices increased with the effect that the responsibility for purchasing CABGs and PTCAs increasingly shifted from purchasing authorities to patients' GPs.

Meanwhile, the Department of Health introduced a new weighted capitation formula in 1991 to fund regions, and it was recommended that it should be used to allocate resources to district purchasing authorities. Each region slowly phased in the use of this formula to fund districts and it was established in all areas except Greater Glasgow by 1994/95. The new formula, based on capitation adjusted for age and a measure of need, caused a redistribution of resources creating *per capita* losing and *per capita* gaining districts.

As the purchasing function developed, with the advent of better information on unit prices and activity, districts and district consortia moved away from block contracts. Block contracts, where the purchaser pays the provider a fixed sum for access to a defined range of services to meet the demand from the purchaser's resident population, do not allow purchasers to increase the efficiency of resource use and place providers in a situation of uncertainty regarding their workload. Purchasers moved either to more sophisticated block contracts, where they set a target for the level of activity to be carried out based on projections of activity and unit costs, or to cost and volume contracts which are more precise as a fixed price is set for a specified target volume of treatment.

The length of contracts also changed. Initially, most contracts were for one year at the end of which the need for the service was reviewed and the contract changed if required. One region, however, chose to purchase services on a three-year rolling contract in order to protect the service in the initial stages of the reforms. By 1994, hospitals were considering longer-term contracts to enable them to carry out service developments. A seven-year commitment from purchasers had been negotiated in one area but is unlikely to be translated into a seven-year contract due to a reluctance by purchasers to commit themselves to

Table 1. Key features of commissioning in the four study areas from 1991/92 to 1994/95.

			1991/92	*1992/93*	*1993/94*	*1994/95*
Responsibility for purchasing						
	SE Thames	CABG	Type 1	Type 3	Type 3	Type 3
	N Western	CABG	Type 2	Type 2	Type 2	Type 4
	E Anglian	CABG	Type 4	Type 4	Type 4	Type 4
	G Glasgow	CABG	N/A	Type 1	Type 1	Type 1
		PTCA	N/A	Type 4	Type 4	Type 4
Resource allocation						
	SE Thames	CABG	Steady state	Weighted capitation	Weighted capitation	Weighted capitation
	N Western	CABG	Steady state	Steady state	Steady state	Weighted capitation
	E Anglian	CABG	Steady state	Weighted capitation	Weighted capitation	Weighted capitation
	G Glasgow	CABG	Steady state	Steady state	Steady state	Steady state
Type of principal contract						
	SE Thames	CABG	Block	Block	Sophisticated block	Sophisticated block
	N Western	CABG	Block	Block	Block	Sophisticated block
	E Anglian	CABG	Cost and volume	Cost and volume	Cost and volume	Cost and volume
	G Glasgow	CABG	N/A	Cost and volume	Cost and volume	Cost and volume
		PTCA	N/A	Block	Cost and Volume	Cost and volume
Length of contract						
	SE Thames	CABG	12 months	12 months	12 months	12 months
	N Western	CABG	3 years			12 months
	E Anglian	CABG	12 months	12 months	12 months	12 months*
	G Glasgow	CABG	N/A	12 months	6 months	12 months
		PTCA	N/A	12 months	12 months	12 months

Notes:

Type 1: Regional purchasing in which region established contracts with local providers and top-sliced funds for these services.

Type 2: Regional purchasing in which region contracted with providers and charged districts according to their level of use.

Type 3: District purchasing consortia in which the responsibility for purchasing these services has been devolved to districts who have formed purchasing consortia.

Type 4: District purchasing in which the responsibility for purchasing was taken on by individual districts.

N/A: Not applicable.

(* An agreement was sought from all main purchasers for a seven year commitment, although contracts would still be issued on a one year basis.)

any one provider for so long. So despite intentions, contracts in all four areas in 1994/95 were still only for 12 months.

Nature of the Market

When contracting was devolved to districts and district consortia from regions, providers were placed in the position of having to compete for contracts. Purchasers, both district health authorities and fundholding GPs, started to question the configuration of services and the traditional choice of providers.

Purchasers initially contracted at historical levels of activity with providers with whom they already had established links. As contracting developed, however, a spectrum of approaches to purchasing emerged. As regards volume, some purchasers said that they recognized cardiac surgery as a priority and sought to increase the level of activity so as to meet *The Health of the Nation* targets (DoH, 1993). In contrast, others continued to base contracts on historical trends in utilization. As regards patient flows, the majority of purchasers did not change their referral patterns radically. Those that did were influenced by price rather than claims of improved quality. Some purchasers reduced the number of providers with whom they contracted, though this was mainly the result of central planning initiatives such as the Tomlinson Inquiry, rather than market forces.

In general, the contractual relationships between purchasers and their main providers and between providers and their main purchasers were stable (see table 2). In South East Thames Region, the providers felt that the relationship was open because information about activity, costs and quality was shared freely with purchasers. This view of stability and openness was not held by their purchasers who were actually in the process of altering their referral patterns and switching contracts. In contrast, the views of purchasers and providers appeared to be concordant in the other three areas, in part because of the lack of alternative local providers.

Despite the contractual relationship between purchasers and providers being predominantly stable, all providers felt that they had to compete for contracts (see table 2). This competitive environment arose as a result of providers having

Table 2. Key features of the relationship between purchasers and providers and providers' responses to questions regarding the competitive environment in 1993/94.

	Providers: 'What is your relationship with your main purchasers?'	*Purchasers: 'What is your relationship with your main providers?'*	*Providers: 'Do you compete for contracts?'*	*Providers: 'Is the basis of competition fair?'*
SE Thames	Stable open contractual relationship	Short-term buying and selling arrangements	Yes	No, tendering process is unfair and Special Health Authorities have an unfair advantage
N Western	Stable contractual relationship	Stable contractual relationship	Yes	No, tendering process and regulation by Region is unfair
E Anglian	Stable long-term contractual relationship	Stable long-term contractual relationship	Yes	Yes
G Glasgow	Stable contractual relationship	Stable contractual relationship	Yes	Yes

Table 3. Problems experienced by purchasers and providers in 1991/92 and 1993/94.

	Problems experienced in 1991/92	*Problems experienced in 1993/94*
Providers	(1) Type of contract (2) Lack of routine information (3) Appropriate organizational level for purchasing (4) Uncertainty about demand (5) Achieving equality between purchasers (6) Lack of fair competition	(1) Uncertainty about demand (2) Lack of fair competition (3) Inability to carry out service developments (4) Problems related to fundholding GPs (5) Problems related to target waiting times
Purchasers	(1) Type of contract (2) Lack of routine information (3) Appropriate organizational level for purchasing (4) Weighted capitation (5) Setting specialties against each other (6) Conflict with *The Health of the Nation*	(1) Managing demand (2) Conflict with *The Health of the Nation* (3) Difficulties with price comparability (4) Lack of information on patient outcomes (5) Loss of resources under weighted capitation

to maintain their contracts with their main purchasers, compete for contracts from more distant districts, and compete for patients from fundholding GPs who were controlling an ever increasing proportion of the market.

Providers were divided in their views as to the fairness of competition. In the South East Thames and the North Western Regions competition through competitive tendering was thought to be unfair. It was argued that purchasers assessed tenders with regard to the price, but not the quality of the service provided. This concern was compounded by the feeling that prices were not considered representative of a provider's efficiency because of the different methods used to determine costs. Furthermore, it was felt that tenders were more likely to be offered to inefficient providers who, charging their main local purchasers full cost and retaining excess capacity, could then charge other more distant purchasers at marginal cost to attract additional tenders. Providers also felt that, in the early years, London's Special Health Authorities had had an unfair advantage since they had been allowed to charge lower prices due to subsidies received for research and teaching.

Obstacles During the First Year (1991/92)

In the first year of the reforms, when most regions retained control over purchasing for these services and before the traditional means of allocating resources to districts gave way to weighted capitation, purchasers and providers struggled to deal with the problems the new contracting system imposed (see table 3). They faced five new challenges.

Handling Logistics

The overriding problem faced by both purchasers and providers was handling the complexities of the new system including the type of contract used, the lack of routine information on which to

base contracts and the appropriate organizational level for purchasing cardiac services. Block contracts were high risk for providers and many found that their actual level of activity exceeded the anticipated level, leading to a financial loss. In contrast, cost and volume contracts caused waiting lists to grow because as the number of emergencies rose elective cases were usurped. Meanwhile, block contracts gave no guarantee to purchasers as to the volume and type of work that would be carried out and cost and volume contracts were difficult to define due to the inability of providers to price their services according to case-mix. Lack of information on which to base contracts was a limiting factor for both parties. Providers were concerned about the expense they faced in collecting data on the cost, activity and quality of services. Purchasers, unable to make comparisons between providers on the basis of quality due to a lack of uniform indicators, were having to base their choice on price alone. Even when a purchaser had placed a contract, monitoring the service was again hampered by lack of data.

The appropriate organizational level for purchasing was a concern both for providers and purchasers. Providers found it easier to negotiate contracts which covered more than one district as this avoided the time and expense of negotiating lots of small volume contracts with their inevitable risks. On the purchasing side, there was a conflict between regions and districts about who should be responsible for purchasing. The former argued that districts did not have the necessary skills and that if these services were purchased on a regional basis equality of access could be ensured. However, the districts argued that they were in a better position both to assess the needs of their resident population and to choose between competing demands.

Managing Demand

Providers faced difficulties in managing demand for their services because they were uncertain about the actual number of patients that would be referred to them. This, in turn, both reflected the difficulties purchasers faced in coming to terms with their new function, which sometimes led to contracts being agreed after the financial year had begun, and the impact of the introduction of weighted capitation. The new funding formula meant that some provider units situated in *per capita* losing districts suffered a reduction in income which in turn caused problems for their purchasers who, as a consequence, had to cover a higher proportion of the provider's fixed costs.

Achieving Equality of Access

Providers became aware of their inability to provide a fair and equitable service to their various purchasers. They found that the clinical priority of patients was being distorted by the amount of resources purchasers were allocating for these services. Providers often completed a contract for a purchaser who still had urgent patients waiting to be treated. Meanwhile contracts with other purchasers were continuing in which patients in less need of urgent attention were being treated. Providers were frustrated with their powerlessness for treating patients according to clinical need.

Unfair Competition

Some providers considered the basis of competition unfair. Well-established providers were thought to be able to compete more effectively than those who were trying to develop their service. Some providers also felt there was too much central control over the market, which tended to favour certain providers over others.

Facing Conflicts

Purchasers found they were coming up against several conflicts. First, in setting priorities for health care, they felt that involving clinicians from the provider units in discussions about how to choose between competing needs for health care would result in setting specialties against each other. Second, purchasers found that contracting could be in direct conflict with *The Health of the Nation* policies as contracting rewarded purchasers who achieve maximum efficiency gains as measured by the Efficiency Index (Donaldson *et al.*, 1994; Clarke *et al.*, 1993). As the definition of efficiency was based on maximizing patient activity from the resources available it followed that purchasers achieved higher efficiency gains by increasing hospital activity rather than by moving resources from treatment to prevention, a strategy that was believed to be more likely to meet the goals set in *The Health of the Nation*.

Obstacles During the Third Year (1993/94)

Two years later, when contracting had become better established, some of the early problems had resolved, some remained and some new ones had emerged (see table 3).

Problems Solved

Handling the logistics of contracting was no longer seen to be as serious a problem for purchasers and providers due to the skills that had been developed over the preceding three years. Routine data on costs and activities of cardiac services were being collected so that more sophisticated contracts could be used. This, to a large extent, had taken much of the uncertainty out of contracting.

Problems Remaining

Providers were still concerned about how to manage demand for cardiac services. They were experiencing problems with contractual volumes being exceeded because of an increase in the number of emergencies and an overall increase in referrals. They were also still concerned about their inability to treat patients solely according to clinical need.

Purchasers had also become increasingly concerned about the dramatic increase in demand for CABG and PTCA by their resident population

over the previous few years. Reasons for the increase were that:

- Cardiologists from specialist centres had set up more clinics in district general hospitals, particularly in districts with traditionally low referral rates.
- Out-patient sessions were being conducted by cardiologists in fundholding general practices.
- Diagnostic facilities, including angiography, had been developed in some district general hospitals.

The resulting increase in demand from traditionally low referring districts had not been offset by a decrease in districts with historically high referral rates. Purchasers who were losing resources under weighted capitation were finding it difficult to reduce their commitment to these services in view of increasing demand. As a result, greater pressure was put on reducing expenditure on other services.

Lack of fair competition was still causing a problem for providers, although the nature of their concern had changed to that of pricing. Many felt that they were put at a competitive disadvantage as a result of being efficient and pricing their services at true average cost. Other providers with much lower prices were felt to be distorting the market in a variety of ways including using cardiac services as a 'loss leader' to attract business for other services, subsidizing the service through monies received from research functions, cross-subsidizing between services (which had been banned by the NHS Management Executive), or charging local purchasers the full cost while allowing other purchasers to use their services at marginal cost.

Lack of data on the quality of the service remained a problem for purchasers who were continuing to select providers on the basis of price. However, they found it was almost impossible to make meaningful comparisons of prices because providers did not all use the same cost accounting systems, apportionment rules and methods of product specification. They felt that price alone could not be used as an indication of efficiency unless all providers used the same method of pricing and achieved the same outcome.

Purchasers were also still finding that contracting sometimes conflicted with the objectives of *The Health of the Nation*. Purchasers argued that the more of their patients that were treated, the more credibility they received because treating patients was easily quantifiable while promoting health was not.

New Problems

Several new problems had emerged for providers. First, providers became increasingly concerned about the future development of their services. Demand for the service had risen with no increase in the amount of resources available. Providers therefore found that their ability to carry out service developments was limited. Second, growth in the number of fundholding GPs added to the existing equity problems. Although providers generally did not have an explicit policy of giving the patients of fundholding GPs a better service, several found that as a result of market pressures and the need to maintain their share of the ever increasing market controlled by fundholding GPs, they had to provide a quicker, cheaper and sometimes better quality service than that provided for district purchasers. Third, although target waiting times were welcomed by providers, many found that they were either having to distort clinical priorities in order to achieve them or refer non-urgent cases back to their GPs rather than put them on a waiting list. This problem had arisen because many purchasers were still buying services on a historical basis and were not basing their decisions on the need to achieve the 12 month in-patient waiting time target.

Discussion

There has been a complex web of inter-connected problems which, in general, caused more problems for purchasers than providers initially, but which appear to be of increasing concern to providers. Clearly, the purchasing function has developed considerably over the last four years and the contracting process has become more sophisticated. The majority of regions have now relinquished their control over the market for specialist services and have devolved the responsibility to districts, district consortia and GP fundholders whose purchasing skills have developed. There still exists a lack of appropriate data on activity and costs on which to base contracts; however purchasers have dealt with this problem by creating sophisticated block contracts, where an agreement is set between the two parties on a target level of activity to be carried out for a fixed sum which does not require perfect information.

Despite the development of contracting, purchasers and providers continue to express misgivings about the way specialist services are commissioned. Purchasers found that the increase in demand for CABG and PTCA, in part brought about by initiatives set up by providers, was putting an ever increasing burden on their limited budget and more efficient use of resources was made difficult by their inability to make meaningful comparisons between the quality and cost of providers' services due to the paucity of accurate and comparable information.

Providers' concerns seem to have become more acute since the introduction of a market economy. In the first year of the reforms their main concern was how to deal with the contracting process. By the third year, providers were more concerned about the future. Some providers have experienced an increase in demand for their services with no concurrent increase in the resources available. This problem has been

over the previous few years. Reasons for the increase were that:

- Cardiologists from specialist centres had set up more clinics in district general hospitals, particularly in districts with traditionally low referral rates.
- Out-patient sessions were being conducted by cardiologists in fundholding general practices.
- Diagnostic facilities, including angiography, had been developed in some district general hospitals.

The resulting increase in demand from traditionally low referring districts had not been offset by a decrease in districts with historically high referral rates. Purchasers who were losing resources under weighted capitation were finding it difficult to reduce their commitment to these services in view of increasing demand. As a result, greater pressure was put on reducing expenditure on other services.

Lack of fair competition was still causing a problem for providers, although the nature of their concern had changed to that of pricing. Many felt that they were put at a competitive disadvantage as a result of being efficient and pricing their services at true average cost. Other providers with much lower prices were felt to be distorting the market in a variety of ways including using cardiac services as a 'loss leader' to attract business for other services, subsidizing the service through monies received from research functions, cross-subsidizing between services (which had been banned by the NHS Management Executive), or charging local purchasers the full cost while allowing other purchasers to use their services at marginal cost.

Lack of data on the quality of the service remained a problem for purchasers who were continuing to select providers on the basis of price. However, they found it was almost impossible to make meaningful comparisons of prices because providers did not all use the same cost accounting systems, apportionment rules and methods of product specification. They felt that price alone could not be used as an indication of efficiency unless all providers used the same method of pricing and achieved the same outcome.

Purchasers were also still finding that contracting sometimes conflicted with the objectives of *The Health of the Nation*. Purchasers argued that the more of their patients that were treated, the more credibility they received because treating patients was easily quantifiable while promoting health was not.

New Problems

Several new problems had emerged for providers. First, providers became increasingly concerned about the future development of their services. Demand for the service had risen with no increase in the amount of resources available. Providers therefore found that their ability to carry out service developments was limited. Second, growth in the number of fundholding GPs added to the existing equity problems. Although providers generally did not have an explicit policy of giving the patients of fundholding GPs a better service, several found that as a result of market pressures and the need to maintain their share of the ever increasing market controlled by fundholding GPs, they had to provide a quicker, cheaper and sometimes better quality service than that provided for district purchasers. Third, although target waiting times were welcomed by providers, many found that they were either having to distort clinical priorities in order to achieve them or refer non-urgent cases back to their GPs rather than put them on a waiting list. This problem had arisen because many purchasers were still buying services on a historical basis and were not basing their decisions on the need to achieve the 12 month in-patient waiting time target.

Discussion

There has been a complex web of inter-connected problems which, in general, caused more problems for purchasers than providers initially, but which appear to be of increasing concern to providers. Clearly, the purchasing function has developed considerably over the last four years and the contracting process has become more sophisticated. The majority of regions have now relinquished their control over the market for specialist services and have devolved the responsibility to districts, district consortia and GP fundholders whose purchasing skills have developed. There still exists a lack of appropriate data on activity and costs on which to base contracts; however purchasers have dealt with this problem by creating sophisticated block contracts, where an agreement is set between the two parties on a target level of activity to be carried out for a fixed sum which does not require perfect information.

Despite the development of contracting, purchasers and providers continue to express misgivings about the way specialist services are commissioned. Purchasers found that the increase in demand for CABG and PTCA, in part brought about by initiatives set up by providers, was putting an ever increasing burden on their limited budget and more efficient use of resources was made difficult by their inability to make meaningful comparisons between the quality and cost of providers' services due to the paucity of accurate and comparable information.

Providers' concerns seem to have become more acute since the introduction of a market economy. In the first year of the reforms their main concern was how to deal with the contracting process. By the third year, providers were more concerned about the future. Some providers have experienced an increase in demand for their services with no concurrent increase in the resources available. This problem has been

exacerbated in some districts by the effects of the new resource allocation formula. Although some providers have attempted to secure longer term contracts to create greater stability and thus enable service developments to be carried out, purchasers have been reluctant to commit themselves for longer than 12 months. Providers have also been subject to unfair competition in the market place and an ability to maintain clinical need as the basis of selecting patients.

Control over the future of specialist services is to a large extent in the hands of purchasers and the Government. Insufficient resources have always been, and probably will always be, a problem both for purchasers and providers. The key, therefore, is for both parties to ensure that resources are used efficiently. Purchasers could start to base resource allocation decisions on indicators other than just the price of the service, though information on the quality of care could prove to be expensive. In addition, they could start to request providers to supply information on pricing strategies in order to understand why prices differ between providers. Purchasers could also require their main providers to manage and monitor waiting lists using a nationally agreed set of guidelines, including a standard urgency rating system to ensure that equality of access is achieved. Even this, however, would not solve the providers' problem of uncertainty about future demands that arises because purchasers are operating with short-term goals. They make decisions on a year-to-year basis, taking into account their financial situation and the relative strengths of competing demands. Thus, until such time as purchasers are prepared to enter into longer term contracts, providers will continue to experience difficulties in developing their services. Achieving a balance between a provider-led and a purchaser-led market seems a long way off. ■

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Using Information on Outcomes to Set Priorities for Cardiac Surgery

Susan Langham MSc is Research Fellow in Health Economics at the London School of Hygiene and Tropical Medicine. She is involved in a range of studies of priority setting in coronary heart disease services. Charles Normand DPhil is Professor of Health Policy at the School and Head of the Department of Public Health and Policy. Margaret Thorogood PhD is a Senior Lecturer in Epidemiology, and Director of the Collaborative Project on Health Gain. **This is a discussion of the measurement of outcomes to set priorities for cardiac surgery in the United Kingdom National Health Service, and its ramifications.**

Provision of coronary artery bypass grafting (CABG) services in the British National Health Service takes place at an average rate of 278 per million population[1], but varies significantly across the country[2]. This is a much lower provision than in many other countries[3].

The reason for the surprisingly wide variations in rates is due to the uncertainty surrounding what constitutes the right rate of use[4] and the lack of robust criteria for assessing the appropriate overall level of provision.

The waiting list sometimes determines who gets treatment, and not simply when treatment is offered

In some parts of the country a large proportion of cases put on the waiting list are treated only as they become emergencies, with few elective cases being treated[5].

For some patients, therefore, being put on the waiting list means that no surgery is provided, since a proportion of these patients may die before treatment is offered. In this way the waiting list system sometimes determines who gets treatment, and not simply when treatment is offered. A prioritisation system therefore needs to be developed to identify those who will benefit greatly from treatment, and those for whom the expected benefits are relatively small, and for whom the decision not to provide surgery will have little effect on health.

It is of particular importance to ensure that the limited service available is put to the best use

Given the relatively low levels of provision of revascularisation procedures, it is of particular importance to

ensure that the limited service available is put to the best use. This paper reports on progress towards using outcome measures to set priorities in a study which aims to develop a system for prioritising patients on cardiac surgery waiting lists.

Methods

Methods exist both for stratifying the operative risk of patients undergoing coronary revascularisation[6] and for prioritising patients waiting for surgery[7]. They are based on analysis of short term outcomes and consensus of treating physicians. Their objectives are to minimise risk of sudden death, and to give a basis for audit of the quality of surgery by giving surgeons data on expected outcomes. The extent to which this kind of activity can be based on outcome data is dependent primarily on the quality of that data[8].

The first stage of this project was to apply an adapted urgency scoring system, based on the Canadian Consensus Study Approach

The first stage of this project was to apply an adapted urgency scoring system, based on the Canadian Consensus Study approach[7], to data on cardiac surgery in three hospitals to see how the current pattern of prioritising patients compared with that which is implied by the score.

The adaptations made were to allow the use of variables routinely available in the UK, and to reflect the normally longer waiting times. The results of this exercise show that there is very little relationship between the urgency score and the length of time spent waiting by the patient. Some patients with an urgency score indicating high risk of adverse coronary events and therefore requiring urgent revascularisation were waiting longer than other patients with a score indicating low risk. If the use of the urgency scoring system is accepted as an appropriate method for prioritising patients waiting to be admitted for cardiac surgery, it would appear that waiting for cardiac surgery in the UK is not as safe as it could be.

The urgency scoring system has its limitations, the main problem being that a system developed in Canada may not be applicable to UK clinical practice

The urgency scoring system has its limitations, the main problem being that a system developed in Canada may not be applicable to UK clinical practice. However, it is reasonable to assume that outcomes will be better if cases at high risk of sudden death, and cases likely to show improvement in the short term are given priority over those who can wait more safely. It is intended to calculate the urgency score for all new referrals and to monitor the effects of this change.

The second part of this project is attempting to identify the combination of factors which best predict health gain. Data are being collected from several sources

It is hoped that this first phase of the project will improve outcomes by ensuring that those at most immediate risk are given higher priority. It is not clear whether being at high risk as defined by the score is

closely correlated with potential to benefit significantly in terms of health gain. In this context, health gain is best defined in terms of improvement in life expectancy and relief of symptoms.

Conceptually this is simple - the priority should go to those likely to show the greatest increase in life years, the greatest reduction in symptoms or some combination of the two. Some attempts have been made to put these together into utility scores (eg Quality Adjusted Life Years[9]).

There is significant debate about the use of utility scores for priority setting[10], and especially about practical issues of measurement. However, there is less dispute about the appropriateness of giving priority to services which do the most good, however defined.

The second part of this project attempts to identify the combination of factors which best predict health gain. Data are being collected from several sources, including long term follow-up of patients based in Leeds. The aim of this exercise is to move towards a priority index which identifies those most likely to benefit in the longer run.

The exercise will inevitably require refinement as better data on long term survival and quality of life are collected. However, for improving the overall effectiveness of cardiac surgery, it is important to be able to set priorities on the basis of contribution to health gain. As in any such exercise, attention will need to be paid to the changes in the success of treatments as techniques change and develop, so that sensible conclusions can be drawn about the effectiveness of current treatment.

It is not clear whether being at high risk as defined by the score is closely correlated with potential to benefit significantly in terms of health gain

Given the likelihood that the two exercises will produce different prioritisation indices, the question arises about how the commissioners of health services should choose. It has been argued above that a prioritisation system based on health gain is the appropriate method to maximise the benefits from treatment. However, some of those most able to benefit in the long run may be in little danger of sudden death. This suggests that it is important to distinguish between two questions - who should be allocated the surgery, and of those who will gain sufficiently to merit treatment, how should the timing be determined. Put another way, an important objective is to make waiting for surgery safer for those who have to wait.

Better use of current services can increase health gain and reduce the risk of adverse events for those waiting for treatment

A single scoring system is unlikely to achieve both of these. A two-stage scoring system will be needed which selects first those for whom the benefits of treatment are likely to justify surgical intervention, and a second which allocates an urgency score related to risk of immediate adverse events.

The need to prioritise access to CABG in the UK National Health Service is very visible and scores which help to decide who should be given priority are useful. There are various guidelines on the appropriate use of CABG which have been published by the British Cardiac Society[11]. An audit undertaken by the Trent region using appropriateness criteria found that 16% of CABGs were inappropriate[12]. Competition for treatment is therefore likely to occur between people who would be expected to gain from surgery.

There are good arguments against long waits as a rationing mechanism. The reason for this is that total health gain from the interventions is less when long waits are involved. Since revascularisation procedures are typically performed on relatively old people, the

number of years over which benefits can be enjoyed is reduced by waiting for treatment.

Summary

Given the relatively low levels of CABG in the UK there may be a strong case for expansion of the service. However, better use of current services can increase health gain and reduce the risk of adverse events for those waiting for treatment. The two parts of this study should help to do both of these.

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letter

Dear Sir/Madam

While I welcome the advent of 'Focus on Outcome Analysis' and strongly support the growing interest in outcomes research, I would like to take issue with Carol Orchard's acceptance of the concept that results of clinical outcomes evaluation should be made available for public scrutiny. Ms Orchard of course understands that randomised controlled trials provide the only way of studying outcomes so that truly valid comparisons can be made between providers or treatments, and that results of any other studies will be confounded by copious casemix variables as well as bias, inaccuracy and chance. However to assume that this point is understood by members of the public who have not been trained in scientific method (the huge majority) is naive and inaccurate in the extreme. Releasing uncontrolled results from observational studies of outcome to those who cannot interpret them properly will attract public criticism of some first-rate providers and adulation of those whose main concern is only to 'play the numbers game' to their own advantage. What is to be gained from that?

Yours sincerely
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focus on outcome analysis invites comment from readers on the issues covered in the journal and on other important outcomes issues.